MINING CONGRESS JOURNAL

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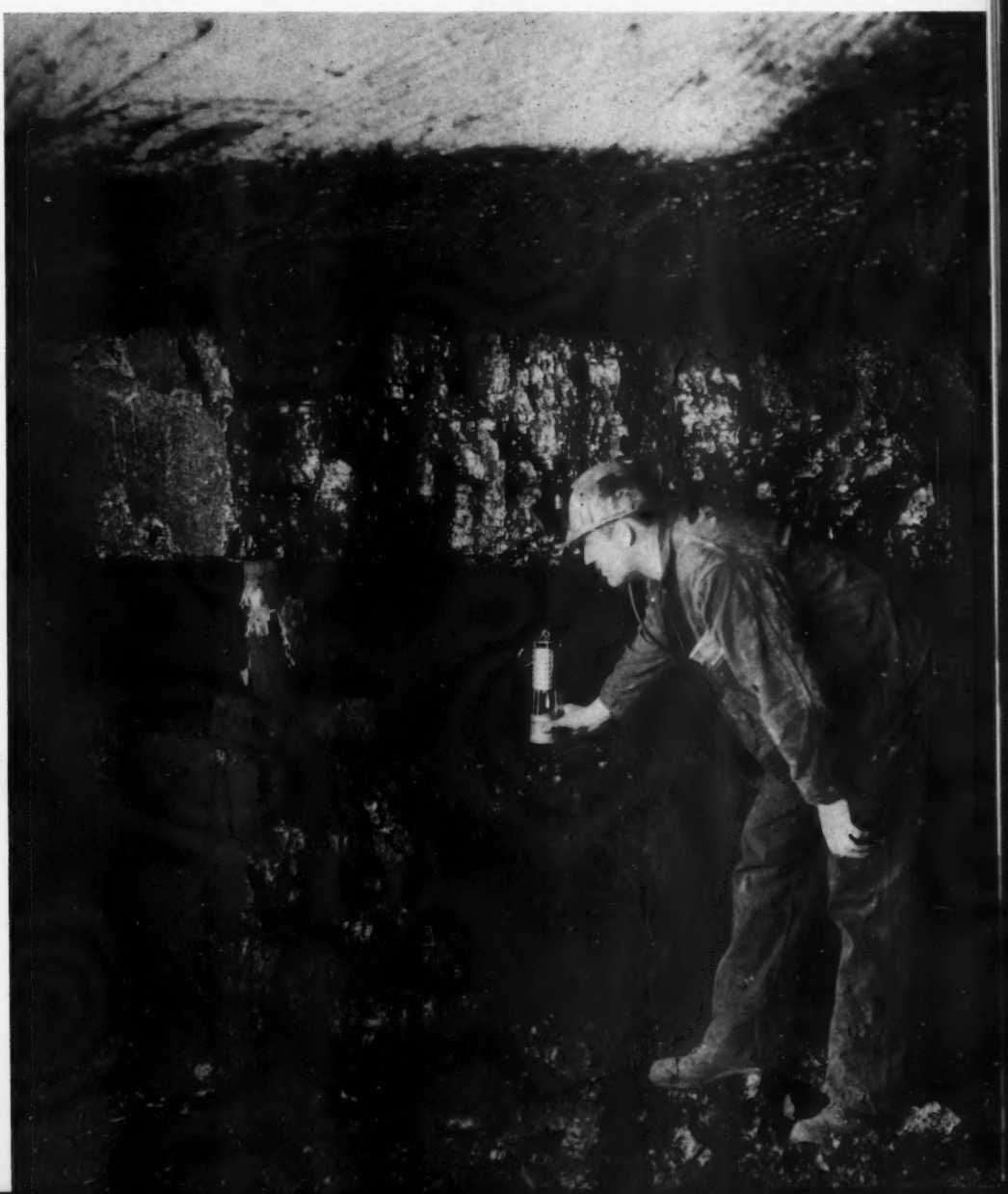

A JOURNAL for the ENTIRE MINING INDUSTRY

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Index

MINING CONGRESS JOURNAL

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MINING CONGRESS JOURNAL
Index to Volume 28
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A

A Field Test for Quicksilver, Geo. R. Fansett .....Nov. 28
A Modern Aid in Maintenance—Metallizing .....Sept. 17
A War Problem, Mechanical Loaders Help Solve, W. F. Netzeband.....Nov. 18
Administration of Premium Price Plan, Jesse L. Maury.....Dec. 30
Air Freighting at Davao Gold Mines, A. H. Shoemaker .....Mar. 25
Alloy Steels, Supplying Metals for, Miles K. Smith .....Dec. 35

AMERICAN MINING CONGRESS—
Forty-fourth Annual Meeting of American Mining Congress Held in Cleveland .....Mar. 40
Mining Congress Aids Industry in War Effort, Julian D. Conover.....Mar. 42

Coal Convention—
Coal Convention Contributes Force to the Industry's War Effort.....May 38
Coal Convention Plans Become More Vitally Important .....Jan. 43
Digest of Papers.....June 40
Echoes from the Coal Convention..June 36
1942 Coal Convention to be Minus Exhibits .....Mar. 33
1942 Coal Show Program Revised, Feb. 80

Coal Division—
Annual Conference of the Coal Division, American Mining Congress .....Dec. 43
Labor Situation as Reported by the Coal Division .....Aug. 39
Manpower Shortage—A New Experience in Coal Mining, G. B. Southward .....July 38

Coal Division Reports—
An Announcement of a Study on Belt Conveyors for Underground Gathering, Carel Robinson.....Jan. 49
Belt Conveyors for Underground Gathering Haulage .....Nov. 44
Direct Current Wiring Systems for Conveyor Mining, W. F. Roberts....June 56
Direct Current Wiring Systems for Conveyor Mining—Part II, W. F. Roberts .....July 39
Maintenance and Inspection of Mine Haulage Roads .....May 33
Mineral Composition and Structure of Mine Roof Rocks, Paul H. Price and A. J. W. Headlee.....Apr. 54
Roof Breaks in Pillar Mining.....Mar. 34
Service Haulage Tracks for Mobile Loading Machines .....Sept. 47
Supervision for Mobile Loading Machine Operations, S. M. Cassidy..Feb. 75
The Committees Report to the Annual Conference .....Dec. 45
Treated Timber for Mine Roof Support .....Oct. 46

Western Division—
Metal Mine War Conference.....Oct. 25
Metal Mine War Conference.....Nov. 29
Metal Mining Industry Holds War Conference .....Dec. 14
An Abandoned Mine, Reopening and Modernizing, Will B. Jamison.....Nov. 32
An Old Mine Being Modernized—New Almaden, C. N. Schuette.....May 25
Anthracite Industry—1941, Progress in the, W. H. Lesser.....Feb. 27
Antimony in 1941, R. G. Hall.....Feb. 52

B

Bituminous Coal—1941 .....Feb. 18
Borax Mine, Stope Filling in a, C. G. Grim, May 29
Borax, Potash and, Russell W. Mumford, Feb. 54
Boriana, Mining and Milling Tungsten Ores at, W. H. Munds.....Sept. 14
Brazil's Strategic Mineral Resources, Charles Will Wright.....Oct. 38
Briquetting Coking Coal, Experiences in, J. Shanks .....Apr. 45
Bumps, Coal Mine—Part I, Charles T. Holland .....June 26
Bumps, Coal Mine—Part II, Charles T. Holland .....July 34

C

Calling all Scrap Metals, George T. Weymouth .....May 18
Chromium, Vanadium, Tungsten and..Feb. 50
Coal Dust, Allaying, at Island Creek Coal Company Mines, J. A. Saxe.....Jan. 15
Coal in Brazil, Thomas Fraser.....Oct. 43
Coal Mine Bumps—Part I, Charles T. Holland .....June 26
Coal Mine Bumps—Part II, Charles T. Holland .....July 34
Coal Miner in the War Effort, The Importance of the, Gen. Lewis B. Hershey, Donald M. Nelson and Wilbur A. Nelson .....Aug. 38
Coal, Mineral Matter in, G. C. Sprunk and H. J. O'Donnell.....June 20
Coal Mining, Safety in, Cadwallader Evans, Jr. .....Feb. 26

Coal Preparation—
Experiences in Briquetting Coking Coal, J. Shanks .....Apr. 45
Mineral Matter in Coal, G. C. Sprunk and H. J. O'Donnell.....June 20
Preparation Plant of the Dawson Daylight Coal Co., W. J. Borries....Mar. 8
Progress in Coal Utilization and Preparation in 1941, J. E. Tobey.....Feb. 20
Coal Production, New Practice in Slate Loading Raises, C. R. Nailler.....July 12

Concentration—
Coarse Concentration, W. L. Zeigler, Feb. 69
Current Fine Grinding Practice and Recent Developments in Equipment, Roy Hatch .....Feb. 67
Flotation, A. W. Fahrenwald.....Feb. 71
Magnesium by Electrothermic Reduction, H. A. Doerner.....Jan. 35
Mining and Milling Tungsten Ores at Boriana, W. H. Munds.....Sept. 14
Mining Quicksilver in Nevada, S. H. Williston .....Nov. 24
Reduction Crushing, Max W. Bowen..Feb. 65
Roasting Improves Gold Recovery at Getchell Mine, Fred Wise.....Apr. 48

Conservation—
Coal Conservation by Selective Mining and Reject Recovery, E. B. Winning .....Dec. 39
Material Conservation at the Mines, Oct. 30
Conveyors, Belt, in Metal Mining, W. E. Philips .....June 24
Copper in 1941, T. H. Miller.....Feb. 45
Cracking Hard Rock on "The Hill," Nov. 51; Dec. 51
Crushing, Reduction, Max W. Bowen, Feb. 65

D

Davao Gold Mines, Air Freighting at, A. H. Shoemaker.....Mar. 25
Dawson Daylight Coal Co., Preparation Plant of the, W. J. Borries.....Mar. 8
Depleted Mine, New Operation Replaces, W. P. Tams, Jr.....Sept. 32
Determining Pressure Zones in Mine Pillars .....Aug. 36
Developing Strategic Metal Production for War, Charles B. Henderson.....Dec. 32
Developments in Drilling, Blasting and Stoping, Metal Mining, Lucien Eaton, Feb. 31
Dragline Electrification, Progress in Shovel and, Phelan McShane.....Oct. 16
Drilling, Blasting and Stoping, Metal Mining—Developments in, Lucien Eaton..Feb. 31
Dustless Treatment of Coals with Materials Other than Oil, The, Ralph A. Sherman and George W. Land.....Dec. 48

E

Editorials—
A Job for Posters.....July 11
A Tribute to Cooperation.....Dec. 13
Absenteeism in Wartime.....July 11
Approved by Censor.....Feb. 17
Decision Pending on Metal Convention, June 19
Equity for the Mining Industry....July 11
Excess Profits of Mines.....Jan. 10
Explosives Control .....Feb. 17
How Hard Are We Working?.....Nov. 17
Labor Peace—A Prelude to World Peace, June 19
Man Lives Not by Bread Alone.....Aug. 17
Metal Miners in War and Peace...Dec. 13
More Mine Safety Effort.....June 19
Our New Format.....Oct. 15
P-56 and Western Mining.....Apr. 25
Realism Needed on the Home Front, Sept. 13
Remove the Taxation Hurdles.....Aug. 17
Safety First on the Home Front....May 7
Silver—A Good Pinch Hitter.....Apr. 25
The Forty-Niner Offers a Lesson....May 7
The Northwest Must Have More Coal, Nov. 17
The Rising Tide.....Feb. 17
Wanted—Manpower .....Apr. 25
White House Letter.....Mar. 7
Who's Blocking the Labor Supply?..Oct. 15
Women in the Mining Industry....Sept. 13
Electrical Equipment, Maintaining Explosion-proof, Phelan McShane.....July 28
Electrification, Progress in Shovel and Dragline, Phelan McShane.....Oct. 16
Electrothermic Reduction, Magnesium by, H. A. Doerner.....Jan. 35
Explosion-proof Electrical Equipment, Maintaining, Phelan McShane.....July 28

F

Filling Mine Stopes with Mill Tailings, C. W. Plumb.....Jan. 12
Fine Grinding Practice, Current, and Recent Developments in Equipment, Roy Hatch .....Feb. 67
Flotation, A. W. Fahrenwald.....Feb. 71
Fluorescent Light—The Prospector's New Tool, Richard Hamilton.....Apr. 52
Foreman, The Modern, Looks in the Mirror .....Sept. 37

G

Geological Factors in Recent Ore Discoveries—
Discovery in the Intermountain Area, W. R. Landwehr.....Jan. 18
Factors in Ore Discovery, Reno H. Sales, Jan. 32
Factors in Ore Discovery in the Southwest, R. S. Butler.....Jan. 28
New Developments in Ore Discovery in Montana and Northern Idaho, John Edgar and Norman M. Smith.....Jan. 27
Ore Discovery in Colorado, Wyoming and the Black Hills, James Boyd.....Jan. 24

Ore Search in the Tri-State District, George M. Fowler....Jan. 26
Status of Ore Discovery in California and Oregon, Carlton D. Hulin...Jan. 21
The Human Element in Finding Mines, James W. Wade....Jan. 23
Trends in Ore Geology, Augustus Locke, Jan. 30
Getchell Mine, Roasting Improves Gold Recovery at, Fred Wise....Apr. 48
Government, Wheels of, A. W. Dickinson, Jan. 53; Feb. 78; Mar. 38; Apr. 57; May 36; June 54; July 42; Aug. 51; Sept. 50; Oct. 48; Nov. 49; Dec. 53

H

Heat Sickness, Prevention of, Medical Committee, Industrial Hygiene Foundation, Aug. 25
Hoists and Scrapers, Block Caving with Slusher, Paul J. Sirkegian....Mar. 11
Hoists, Slusher, Aid in Reducing Tramming Hazards, D. E. Fritz....Aug. 20
Hydraulicking, Problems in Present-Day, John Power Hutchins....Mar. 20
Hydrogen from Lignite, W. B. Pratt..Mar. 16

I

Importance of the Coal Miner in the War Effort, The, Gen. Lewis B. Hershey, Donald M. Nelson, Wilbur A. Nelson...Aug. 38
Industrial Hygiene Foundation, Medical Committee, Prevention of Heat Sickness Aug. 25
Inventory Your Manpower Now!, Major General Lewis B. Hershey....Sept. 22
Iron and Steel Scrap, Harold E. Carmony Feb. 59
Iron Ore Industry, Review of the, Patrick Butler....Feb. 39
Island Creek Coal Company Mines, Allaying Coal Dust at, J. A. Saxe....Jan. 15

L

Labor Situation as Reported by the Coal Division....Aug. 39
Latin America, Strategic Minerals Available in, J. S. McGrath....Feb. 73
Lead, The Position of, F. E. Wormser..Feb. 36
Legislation—
Trade Agreement Negotiations with Mexico and Bolivia, Julian D. Conover..June 32
Wheels of Government, A. W. Dickinson, Jan. 53; Feb. 78; Mar. 38; Apr. 57; May 36; June 54; July 42; Aug. 51; Sept. 50; Oct. 48; Nov. 49; Dec. 53
Lignite, Hydrogen from, W. B. Pratt..Mar. 16

M

Maintaining Explosion-proof Electrical Equipment, Phelan McShane....July 28
Maintenance in War Time—Comments by the Manufacturer, E. R. Rankin....Sept. 43
Maintenance in War Time—Comments by the Operator, C. V. Beck....Sept. 42
Making a Mine Dump Give to the War Effort, Jesse R. Villars....Nov. 21
Manganese Situation, The Domestic, Frederick Laist....Feb. 48
Manpower Problem, Metal Mining's..Sept. 23
Materials Output Gains Speed, Strategic and Critical, Charles B. Henderson..May 14
Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941, Sales of, W. H. Young, R. L. Anderson, G. A. Lamb and F. M. Shore....Feb. 22
Mechanical Loading, Track Mounted at Snow Hill....Nov. 39
Mechanized Mining—
Belt Conveyors in Metal Mining, W. E. Philips....June 24
Block Caving with Slusher Hoists and Scrapers, Paul J. Sirkegian....Mar. 11
Coal Pinning Machine, C. M. Guthrie Oct. 37
High Voltage Power Distribution Underground, A. L. Lee....Apr. 30
Mechanical Loaders Help Solve a War Problem, W. F. Netzeband....Nov. 18
Mechanical Operating Methods in Northern West Virginia, E. D. Gall....Aug. 26
Mechanized Mining Under Difficult Seam Conditions, C. W. Thompson....Apr. 26
Metal Mining—Developments in Drilling, Blasting and Stoping, Lucien Eaton Feb. 31
New Practice in Slate Loading Raises Coal Production, C. R. Nailler....July 12
Progress in Shovel and Dragline Electrification, Phelan McShane....Oct. 16
Reopening and Modernizing an Abandoned Mine, Will B. Jamison....Nov. 32
Sales of Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941, W. H. Young, R. L. Anderson, G. A. Lamb and F. M. Shore..Feb. 22
Service Haulage Tracks for Mobile Loading Machines....Sept. 47
Shuttle Cars Achieve High Output Per Shift at No. 25 Mine, G. B. Southward....Oct. 26
Slusher Hoists Aid in Reducing Tramming Hazards, D. E. Fritz....Aug. 20
Track Mounted Mechanical Loading at Snow Hill....Nov. 39
Turbine Pumps Do Their Bit for Zinc, W. F. Netzeband....Aug. 18
Medical Committee, Industrial Hygiene Foundation, Prevention of Heat Sickness....Aug. 25
Metal Mining, Belt Conveyors in, W. E. Philips....June 24
Metal Mining's Manpower Problem...Sept. 23
Metallizing—A Modern Aid in Maintenance Sept. 17
Metals and Minerals Production, Miscellaneous, Richard J. Lund....Dec. 34
Metals, Price Control of, Donald H. Wallace....Dec. 27
Mexico and Bolivia, Trade Agreement Negotiations with, Julian D. Conover....June 32
Mill Tailings, Filling Mine Stopes with, C. W. Plumb....Jan. 12
Mine Cars, Weld-Fabrication of....Jan. 38
Mine Equipment, Wartime Care of, Edgar Schweitzer....July 20
Mine Personnel Problem in Wartime, Tackling the, G. R. Spindler....May 21
Mine Pillars, Determining Pressure Zones in....Aug. 36
Mine Scrap, Utilizing by Welding....Mar. 18
Minerals Production, Miscellaneous Metals and, Richard J. Lund....Dec. 34
Mining Coal in the Ohio River, Everett Drennen....Sept. 38
Mining Priority Orders, Important Change in....Mar. 50
Miscellaneous Metals and Minerals Production, Richard J. Lund....Dec. 34
Mobile Loading Machines, Service Haulage Tracks for....Sept. 47
Molybdenum—Supply Increased, John E. Wilson....Feb. 44

N

Nevada, Mining Quicksilver in, S. H. Williston....Nov. 24
New Almaden—An Old Mine Being Modernized, C. N. Schuette....May 25
New Equipment—
A Rubber Lung for Artificial Respiration Dec. 66
A-C All-Position Welding Electrode..Dec. 66
Air-Cooled, Fire-Proof Transformer..July 59
Amerinol Hose....Apr. 79
An Aid in Preventive Maintenance..Sept. 62
Arc Control Stations for Welding..Nov. 66
Arcing Horns for Increasing Protection of Conductors....May 53
Automatic Car Spotter....Sept. 63
Ball Grip Couplings....Apr. 79
Barrel Carrier....July 63
Black Light Lamps....Feb. 94
Burnisher Material for Care of Commutators and Rings....Apr. 78
Coal Dryer....Apr. 78
Coatings for Black-out....Feb. 94
Constant Level Lubricator....June 74
Critical Materials Saved in New System of Transformer Cooling....Oct. 66
Crusher Design....Apr. 79
Cutter Heads for Shop Use....July 63
Demagnetizer....Feb. 95
Divergent Nozzle Increases Cutting Speed May 53
Drum Carriers....Mar. 59
Drum Controllers....Apr. 79
Dustfoe Respirator....Jan. 62
Dynamite Cartridge That Expands Under Tamping....May 55
Electric-Hydraulic Barrel Pump....Dec. 67
Electric Switching Locomotive....Mar. 58
Electronic Control of Mechanical Feeders on Pulverizing Machines....Apr. 79
Electronic Crest Voltmeter....Oct. 66
Electronic Motor Control....Feb. 95
Electronic Separator Concentrates Metallic Ore....Aug. 63
Finger Protection....Sept. 62
Fire-Proof Transformers....Mar. 59
First Aid Kit....Jan. 63
Floodlights for Routine and Emergency Night Jobs....July 59
For Testing pH....June 74
Gang Channel Nuts Available for Testing on Industrial Applications....July 62
Handy Ultra Violet Light for Prospectors May 54
Heavy Duty Rock Drill....May 53
Hydraulic Drillvise....Sept. 63
Improved Arc Welder Control....Jan. 63
Improved Black Light Lamps for Scheelite Prospectors....Aug. 62
Improved Mine Tie....Feb. 94
Improved Respirator....Dec. 66
Improved Wagon Drill for Deep Holes July 59
Instrument for Testing Rail Bonding Mar. 58
Junction Box for D-C Circuits....May 52
Laminated Solenoid Control....Feb. 95
Light-Weight Electric Rail Drill....July 62
Load-Center Unit Substation....June 74
Long Rope Shipped on Flat Car....Apr. 79
Lubricating Systems for Industrial Machinery....Mar. 58
Machine for Use in Rubber Salvage..Sept. 63
Magnetic Log Washer....Oct. 66
Metal Etcher....Oct. 66
Mine Timber Lifting Jack....May 52
Motors....May 55
Motors for Magnesium Dust Locations Aug. 62
New Babbitt Metal....July 62
New Precision Balances....Dec. 67
New Synchromatic Relay....Dec. 67
New Welding Rod....July 62
One-Man Truck-Mounted Coal Drill..Apr. 79
Photoelectric Relays Control Coal Larry Nov. 67
Plastic Suitable to Replace Rubber..Sept. 62
Portable Floodlight for Combustible Areas Sept. 62
Portable Scraper Hauler....Apr. 78
Pulley Oiler....Aug. 62
Pumps for a Wide Range of Duties..Feb. 95
Quick Hardening Iron Cement for Patching Concrete Floors....June 75
Reflector....Oct. 66
Respirator for Protection Against Toxic Dusts....May 54
Robins-Gyrex Vibrating Screen....Mar. 58
Robins-Vibrex Vibrating Screens....Feb. 94
Rotary Type Control Switch....May 53
Round Shank Boring Tools....Mar. 59
Safety Items....May 54
Self-Aligning Idler for Conveyor Belts July 62
Spectrum Chart....Sept. 63
Spray for Treating Burns....July 59
Standard Junction Boxes....Jan. 63
Straight and Angle Swivels....Oct. 66
Strength Ratings Now Marked on 10-inch Suspension Insulators....Mar. 59
Substitutes for Tin-Base Babbitts..July 62
37-Millimeter Shot....Jan. 62
30-Yard Electric Shovel....Jan. 62
Three-Part Pulverizer Hammer.... Sept. 62
Tools for Heavy Machining....June 75
Variable Speed Control....Mar. 59
Wetherill Magnetic Separator....Aug. 63
New Operation Replaces Depleted Mine, W. P. Tams, Jr....Sept. 32
Non-Ferrous Secondary Metals, F. H. Wright Feb. 58
Non-Metallic Minerals—
Alumina from Domestic Sources....Oct. 18
Potash and Borax, Russell W. Mumford Feb. 54
Stope Filling in a Borax Mine, C. G. Grim....May 29
Sulphur in 1941, J. T. Claiborne, Jr. Feb. 56
Northern West Virginia, Mechanical Operating Methods in, E. D. Gall....Aug. 26
No. 25 Mine, Shuttle Cars Achieve High Output Per Shift at, G. B. Southward Oct. 26

O

Obituaries—
Adams, Alva B....Jan. 56
Auchmuty, H. C....Feb. 84
Barnett, John T....May 41
Bassett, Lewis Albert....Mar. 48
Becket, Dr. Frederick M....Dec. 56
Benny, W. J....Jan. 56
Bjorge, Hans P....July 47
Bowen, W. H....May 41
Braden, William....Aug. 54
Brown, Harry Lawrence....Dec. 56
Card, Arthur V....Oct. 52
Carlton, A. D....Jan. 56
Carpenter, Miles M....May 41
Channing, J. Parke....Nov. 54
Christy, E. J....Apr. 69
Clements, John R....Jan. 56
Conrad, Harvey G....May 41
Cowin, G. Donald....July 47
Croll, H. V....Mar. 48
Davis, Harry P....July 47
Dormer, George H....Mar. 48
Duckworth, Charles Beaton....Sept. 53
Earle, E. P....Dec. 56
Eichelberger, Wm. S....Apr. 69
Ellison, W. A....May 41
Emery, William, Jr....July 47
Fishwick, Edward T....May 41
Gabell, G. Richardson....Nov. 54
Gardner, Royal D....July 47
Gibbs, George....Dec. 56
Green, William D....Dec. 56
Gwinn, James W....Jan. 56
Hadley, Joseph G....July 47
Haehnlen, W. L....Apr. 69
Hale, Sydney Arthur....Sept. 53
Hand, John Henry....Oct. 52
Hodges, Abel B. W....May 41
Howe, John A....Oct. 52
Jeffrey, Robert K....Dec. 56
Johnson, Charles....July 47
Jopling, Reginald F....Dec. 56
Jordan, Alexander W....May 41
Joyce, John T....Sept. 53
Kaeding, Charles D....Oct. 52
Kimball, G. Cook....Mar. 48
Knox, George C....Nov. 54
Kuchs, O. M....Jan. 56
Leith, Kenneth....July 47
Leonard, Thomas....Jan. 56
Leschen, Harry J....Sept. 53

Linton, Robert ..... Dec. 56
Moore, Stanley R. ..... Jan. 56
Norris, George L. ..... July 47
Olmsted, Elmer S. ..... Mar. 48
Peele, Robert ..... Dec. 56
Potter, Mark Winslow ..... Oct. 52
Reid, William ..... Sept. 53
Rice, Hugh ..... Sept. 53
Rowe, Reginald M. ..... Nov. 54
Salt, William ..... Dec. 56
Seaman, Halleck W. ..... Mar. 48
Short, R. B. ..... Jan. 56
Spencer, Charles F. ..... Dec. 56
Thompson, Harry T. ..... Oct. 52
Thorne, Harry A. ..... June 62
Toland, Edmund M. ..... July 47
Trent, Walter ..... Feb. 84
Ulrich, W. F. ..... Dec. 56
Vogt, Robert F. ..... June 62
Warden, David R. ..... Sept. 53
Warriner, Samuel D. ..... May 41
Ohio River, Mining Coal in the, Everett Drennen ..... Sept. 38
Open Pit Mining, Trucks In, Observe "Safety First," S. E. Sullivan ..... Oct. 22
Operating a Two-Loading Point Regenerative Incline, M. M. Haley ..... May 11

P

Personnel Problem in Wartime, Tackling the Mine, G. R. Spindler ..... May 21
Philippine Islands, Transporting Ore in the, W. F. Boericke ..... Jan. 44
Pollution—A Perennial Headache, Robert M. Searls ..... Mar. 30
Power Distribution Underground, High Voltage, A. L. Lee ..... Apr. 30
Premium Price Plan, Administration of, Jesse L. Maury ..... Dec. 30
Pressure Zones in Mine Pillars, Determining ..... Aug. 36
Price Control of Metals, Donald H. Wallace ..... Dec. 27
Price Plan, What it Recognizes, John D. Sumner ..... Dec. 29
Priorities—
Important Change in Mining Priority Orders ..... Mar. 50
Problems in Present-Day Hydraulicking, John Power Hutchins ..... Mar. 20
Progress in the Anthracite Industry—1941, W. H. Lesser ..... Feb. 27

Q

Quicksilver, A Field Test for ..... Nov. 28
Quicksilver Industry, The Position of the, Gordon I. Gould ..... Feb. 41
Quicksilver Mining in Nevada, S. H. Williston ..... Nov. 24

R

Regenerative Incline, Operating a Two-Loading Point, M. M. Haley ..... May 11
Reject Recovery, Coal Conservation by Selective Mining and, E. B. Winning ..... Dec. 39
Review of the Iron Ore Industry, Patrick Butler ..... Feb. 39
Rope, Use Care in Socketing, F. P. Spangler ..... June 34

S

Safety and Health—
Allaying Coal Dust at Island Creek Coal Company Mines, J. A. Saxe ..... Jan. 15
Good Ventilation Aids Mine Output, E. A. Anundsen ..... July 17
Metal Mine Safety—1941, W. D. Haselton ..... Feb. 60
Prevention of Heat Sickness, Medical Committee, Industrial Hygiene Foundation ..... Aug. 25
Safety Committee Organized ..... June 60
Safety in Coal Mining, Cadwallader Evans, Jr. ..... Feb. 26
The Dustless Treatment of Coals with Materials Other Than Oil, Ralph A. Sherman and George W. Land ..... Dec. 48
Trucks in Open Pit Mining Observe "Safety First," S. E. Sullivan ..... Oct. 22
Ventilation Surveying ..... Jan. 40
School, War Sends the Coal Miner to, D. C. Jones ..... July 23
Scrap Metals, Calling All, George T. Weymouth ..... May 18
Scrap, Scrap, Scrap ..... Oct. 36
Scrapers, Block Caving with Slusher Hoists and, Paul J. Sirkegian ..... Mar. 11
Seam Conditions, Mechanized Mining Under Difficult, C. W. Thompson ..... Apr. 26
Secondary Metals, Non-ferrous, F. H. Wright ..... Feb. 58
Selective Mining and Reject Recovery, Coal Conservation by, E. B. Winning ..... Dec. 39
Selective Service, Metal Mining and the, Lt. Colonel H. Arnold Rich ..... Dec. 36
Shovel and Dragline Electrification, Progress in, Phelan McShane ..... Oct. 16
Slate Loading Raises Coal Production, New Practice in, C. R. Nailler ..... July 12
Slusher Hoists and Scrapers, Block Caving with, Paul J. Sirkegian ..... Mar. 11
Snow Hill, Track Mounted Mechanical Loading at ..... Nov. 39
Socketing Rope, Use Care in, F. L. Spangler ..... June 34
Some Comparisons of Track Welding Methods ..... May 8
Sponge Iron Process in the Production of Steel, The ..... Aug. 30
Steel Scrap, Iron and, Harold E. Carmony ..... Feb. 58
Steel, The Sponge Iron Process in the Production of ..... Aug. 30
Strategic and Critical Materials Output Gains Speed, Charles B. Henderson ..... May 14
Strategic Metal Production, Developing for War, Charles B. Henderson ..... Dec. 32
Strategic Mineral Resources, Brazil's, Chas. Will Wright ..... Oct. 38
Strategic Minerals Available in Latin America, J. S. McGrath ..... Feb. 73
Supplying Metals for Alloy Steels, Miles K. Smith ..... Dec. 35
Surveying, Ventilation ..... Jan. 40

T

Tackling the Mine Personnel Problem in Wartime, G. R. Spindler ..... May 21
Taxation—
Excess Profits Tax Inequities Between Competitors, Howard I. Young ..... Mar. 28
Special Tax Problems of the Mining Industry, Julian D. Conover ..... Aug. 46
The Domestic Manganese Situation, Frederick Laist ..... Feb. 48
The Importance of the Coal Miner in the War Effort, Gen. Lewis B. Hershey, Donald M. Nelson and Wilbur A. Nelson ..... Aug. 38
The Modern Foreman Looks in the Mirror ..... Sept. 37
The Outlook for Zinc, Wallace G. Woolf ..... Feb. 35
The Position of Lead, F. E. Wormser ..... Feb. 36
The Position of the Quicksilver Industry, Gordon I. Gould ..... Feb. 41
The Prospector's New Tool, Fluorescent Light—, Richard Hamilton ..... Apr. 52
The Sponge Iron Process in the Production of Steel ..... Aug. 30
Track Welding Methods, Some Comparisons of ..... May 8
Tramming Hazards, Slusher Hoists Aid in Reducing, D. E. Fritz ..... Aug. 20
Transporting Ore in the Philippine Islands, W. F. Boericke ..... Jan. 44
Treatment of Coals with Materials Other Than Oil, The Dustless, Ralph A. Sherman and George W. Land ..... Dec. 48
Tungsten—An Important War Metal, D. C. McLaren ..... July 29
Tungsten and Chromium, Vanadium ..... Feb. 50
Tungsten Ores at Boriana, Mining and Milling, W. H. Munds ..... Sept. 14
Two-Loading Point Regenerative Incline, Operating A, M. M. Haley ..... May 11

U

Use Care in Socketing Rope!, F. L. Spangler ..... June 34
Utilizing Mine Scrap by Welding ..... Mar. 18

V

Vanadium, Tungsten and Chromium ..... Feb. 50
Ventilation, Good, Aids Mine Output, E. A. Anundsen ..... July 17

W

War Effort, Making a Mine Dump Give to the, Jesse R. Villars ..... Nov. 21
War Sends the Coal Miner to School, D. C. Jones ..... July 23
Wartime Care of Mine Equipment, Edgar Schweitzer ..... July 20
Weld-Fabrication of Mine Cars ..... Jan. 38
West Virginia, Northern, Mechanical Operating Methods in, E. D. Gall ..... Aug. 26
What the Price Plan Recognizes, John D. Sumner ..... Dec. 29

Z

Zinc, The Outlook for, Wallace G. Woolf ..... Feb. 35
Zinc, Turbine Pumps Do Their Bit for, W. F. Netzeband ..... Aug. 18

Index to Authors

A

Anderson, R. L., W. H. Young, G. A. Lamb and F. M. Shore, Sales of Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941 ..... Feb. 22
Anundsen, E. A., Good Ventilation Aids Mine Output ..... July 17

B

Beck, C. V., Maintenance in War Time—Comments by the Operator ..... Sept. 42
Boericke, W. F., Transporting Ore in the Philippine Islands ..... Jan. 44
Borries, W. J., Preparation Plant of the Dawson Daylight Coal Co. ..... Mar. 8
Bowen, Max W., Reduction Crushing ..... Feb. 65
Boyd, James, Geological Factors in Recent Ore Discoveries—Ore Discovery in Colorado, Wyoming and the Black Hills ..... Jan. 24
Butler, Patrick, Review of the Iron Ore Industry ..... Feb. 39
Butler, R. S., Geological Factors in Recent Ore Discoveries—Factors in Ore Discovery in the Southwest ..... Jan. 28

C

Carmony, Harold E., Iron and Steel Scrap ..... Feb. 59
Cassidy, S. M., Supervision for Mobile Loading Machine Operations ..... Feb. 75
Claiborne, J. T., Jr., Sulphur in 1941 ..... Feb. 56
Conover, Julian D., Mining Congress Aids Industry in War Effort ..... Mar. 42
Trade Agreement Negotiations with Mexico and Bolivia ..... June 32
Special Tax Problems of the Mining Industry ..... Aug. 46

D

Dickinson, A. W., Wheels of Government, Jan. 53; Feb. 78; Mar. 38; Apr. 57; May 36; June 54; July 42; Aug. 51; Sept. 50; Oct. 48; Nov. 49; Dec. 53
Doerner, H. A., Magnesium by Electrothermic Reduction ..... Jan. 25
Drennen, Everett, Mining Coal in the Ohio River ..... Sept. 38

E

Eaton, Lucien, Metal Mining—Developments in Drilling, Blasting and Stoping ..... Feb. 31
Edgar, John and Norman M. Smith, Geological Factors in Recent Ore Discoveries—New Developments in Ore Discovery in Montana and Northern Idaho ..... Jan. 27
Evans, Cadwallader, Jr., Safety in Coal Mining ..... Feb. 26

F

Fahrenwald, A. W., Flotation ..... Feb. 71
Fansett, George R., A Field Test for Quicksilver ..... Nov. 28
Fowler, George M., Geological Factors in Recent Ore Discoveries—Ore Search in the Tri-State District ..... Jan. 26
Fraser, Thomas, Coal in Brazil ..... Oct. 43
Fritz, D. E., Slusher Hoists Aid in Reducing Tramming Hazards ..... Aug. 20

G

Gall, E. D., Mechanical Operating Methods in Northern West Virginia ..... Aug. 26
Gould, Gordon I., The Position of the Quicksilver Industry ..... Feb. 41
Grim, C. G., Stope Filling in a Borax Mine ..... May 29
Guthrie, C. M., Coal Pinning Machine ..... Oct. 37

H

Haley, M. M., Operating a Two-Loading Point Regenerative Incline ..... May 11
Hall, R. G., Antimony in 1941 ..... Feb. 52
Hamilton, Richard, Fluorescent Light—The Prospector's New Tool ..... Apr. 52
Haselton, W. D., Metal Mine Safety—1941 ..... Feb. 60
Hatch, Roy, Current Fine Grinding Practice and Recent Developments in Equipment ..... Feb. 67
Headlee, A. J. W., and Paul H. Price, Mineral Composition and Structure of Mine Roof Rocks ..... Apr. 54
Henderson, Charles B., Developing Strategic Metal Production for War ..... Dec. 32
Strategic and Critical Materials Output Gains Speed ..... May 14

Hershey, Major Gen. Lewis B., Inventory Your Manpower Now!.....Sept. 22
Hershey, Major Gen. Lewis B., Donald M. Nelson and Wilbur A. Nelson, The Importance of the Coal Miner in the War Effort .....Aug. 38
Holland, Charles T., Coal Mine Bumps—Part I .....June 26
Coal Mine Bumps—Part II.....July 34
Hulin, Carlton D., Geological Factors in Recent Ore Discoveries—Status of Ore Discovery in California and Oregon..Jan. 21
Hutchins, John Power, Problems in Present-Day Hydraulicking .....Mar. 20

J

Jamison, Will B., Reopening and Modernizing an Abandoned Mine.....Nov. 32
Jones, D. C., War Sends the Coal Miner to School .....July 23

L

Laist, Frederick, The Domestic Manganese Situation .....Feb. 48
Lamb, G. A., W. H. Young, R. L. Anderson and F. M. Shore, Sales of Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941.....Feb. 22
Land, George W. and Ralph A. Sherman, The Dustless Treatment of Coals with Materials Other Than Oils.....Dec. 48
Landwehr, W. R., Geological Factors in Recent Ore Discoveries—Discovery in the Intermountain Area .....Jan. 18
Lee, A. L., High Voltage Power Distribution Underground .....Apr. 30
Lesser, W. H., Progress in the Anthracite Industry—1941 .....Feb. 27
Locke, Augustus, Geological Factors in Recent Ore Discoveries—Trends in Ore Geology .....Jan. 30
Long, A. E., Roof Breaks in Pillar Mining Mar. 34
Lund, Richard J., Miscellaneous Metals and Minerals Production .....Dec. 34

M

Maury, Jesse L., Administration of Premium Price Plan .....Dec. 30
McGrath, J. S., Strategic Minerals Available in Latin America.....Feb. 73
McLaren, D. C., Tungsten—An Important War Metal .....July 29
McShane, Phelan, Maintaining Explosion-proof Electrical Equipment.....July 28
Progress in Shovel and Dragline Electrification .....Oct. 16
Miller, T. H., Copper in 1941.....Feb. 45
Mumford, Russell W., Potash and Borax Feb. 54
Munds, W. H., Mining and Milling Tungsten Ores at Boriana.....Sept. 14

N

Nailler, C. R., New Practice in Slate Loading Raises Coal Production.....July 12
Nelson, Donald M., Major Gen. Lewis B. Hershey and Wilbur A. Nelson, The Importance of the Coal Miner in the War Effort .....Aug. 38
Nelson, Wilbur A., Major Gen. Lewis B. Hershey and Donald M. Nelson, The Importance of the Coal Miner in the War Effort .....Aug. 38
Netzeband, W. F., Turbine Pumps Do Their Bit for Zinc.....Aug. 18
Mechanical Loaders Help Solve a War Problem .....Nov. 18

O

O'Donnell, H. J. and G. C. Sprunk, Mineral Matter in Coal.....June 20

P

Phillips, W. E., Belt Conveyors in Metal Mining .....June 24
Plumb, C. W., Filling Mine Stopes with Mill Tailings .....Jan. 12
Pratt, W. B., Hydrogen from Lignite..Mar. 16
Price, Paul H. and A. J. W. Headlee, Mineral Composition and Structure of Mine Roof Rocks.....Apr. 54

R

Rankin, E. R., Maintenance in War Time—Comments by the Manufacturer.....Sept. 43
Rich, Lt. Col. H. Arnold, Metal Mining and the Selective Service.....Dec. 36
Roberts, W. F., Direct Current Wiring Systems for Conveyor Mining.....June 56
Direct Current Wiring Systems for Conveyor Mining—Part II.....July 39
Robinson, Carel, An Announcement of a Study on Belt Conveyors for Underground Gathering .....Jan. 49

S

Sales, Reno H., Geological Factors in Recent Ore Discoveries—Factors in Ore Discovery .....Jan. 32
Saxe, J. A., Allaying Coal Dust at Island Creek Coal Company Mines.....Jan. 15
Schuette, C. N., New Almaden—An Old Mine Being Modernized.....May 25
Schweitzer, Edgar, Wartime Care of Mine Equipment .....July 20
Shanks, J., Experiences in Briquetting Coking Coal .....Apr. 45
Sherman, Ralph A. and George W. Land, The Dustless Treatment of Coals with Materials Other Than Oils.....Dec. 48
Shoemaker, A. H., Air Freighting at Davao Gold Mines.....Mar. 25
Shore, F. M., W. H. Young, R. L. Anderson, and G. A. Lamb, Sales of Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941.....Feb. 22
Sirkegian, Paul J., Block Caving with Slusher Hoists and Scrapers.....Mar. 11
Smith, Miles K., Supplying Metals for Alloy Steels .....Dec. 35
Smith, Norman M. and John Edgar, Geological Factors in Recent Ore Discoveries—New Developments in Ore Discovery in Montana and Northern Idaho.....Jan. 27
Southward, G. B., Manpower Shortage—A New Experience in Coal Mining.....July 38
Shuttle Cars Achieve High Output Per Shift at No. 25 Mine.....Oct. 26
Spangler, F. L., Use Care in Socketing Rope! .....June 34
Spindler, G. R., Tackling the Mine Personnel Problem in Wartime.....May 21
Sprunk, G. C. and H. J. O'Donnell, Mineral Matter in Coal.....June 20
Sullivan, S. E., Trucks in Open Pit Mining Observe "Safety First".....Oct. 22
Sumner, John D., What the Price Plan Recognizes .....Dec. 29

T

Tams, W. P., Jr., New Operation Replaces Depleted Mine .....Sept. 32
Thompson, C. W., Mechanized Mining Under Difficult Seam Conditions.....Apr. 26
Tobey, J. E., Progress in Coal Utilization and Preparation in 1941.....Feb. 20

V

Villars, Jesse R., Making a Mine Dump Give to the War Effort.....Nov. 21

W

Wade, James W., Geological Factors in Recent Ore Discoveries—The Human Element in Finding Mines.....Jan. 33
Wallace, Donald H., Price Control of Metals Dec. 27
Weymouth, George T., "Calling All Scrap Metals" .....May 18
Williston, S. H., Mining Quicksilver in Nevada .....Nov. 24
Wilson, John E., Molybdenum—Supply Increased .....Feb. 44
Winning, E. B., Coal Conservation by Selective Mining and Reject Recovery.....Dec. 39
Wise, Fred, Roasting Improves Gold Recovery at Getchell Mine.....Apr. 48
Woolf, Wallace G., The Outlook for Zinc Feb. 35
Wormser, F. E., The Position of Lead..Feb. 36
Wright, Charles Will, Brazil's Strategic Mineral Resources .....Oct. 38
Wright, F. H., Non-Ferrous Secondary Metals .....Feb. 58

Y

Young, Howard I., Excess Profits Tax Inequalities Between Competitors.....Mar. 28
Young, W. H., R. L. Anderson, G. A. Lamb and F. M. Shore, Sales of Mechanical Loading and Cleaning Equipment for Use in Coal Mines in 1941.....Feb. 22

Z

Zeigler, W. L., Coarse Concentration..Feb. 69

XU

MINING CONGRESS JOURNAL

VOLUME 29, NUMBER 1

Contents

FOR JANUARY 1943

Editorial Director
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Mine operators, workers and members of their families realize that 1943 will be a tough year, but Victory looms more brightly on the horizon. Donald M. Nelson, Chairman, War Production Board, sums up everybody's job thus:

"Keep this thought burning in your minds and heart; that countless lives and untold suffering will be saved if extra effort at home brings Victory just one month closer.

"The gravest fighting and the hardest work lie ahead of us."

★

Page

Front Cover:
Selective mining prepares metallurgical coal at the mine of the Inland Steel Company, Indianola, Pa.

Editorials:
It's Only the Beginning 11
Home Front Casualty List 11
Why Not a Director of Mining? 11

Treated Timber at Isabella Mine 12

A Scientific Solution of the Multiple Shift Problem 15
By PROF. NATHANIEL KLEITMAN

Lead—Saver of Critical Materials 17

A Coal Dust Collector for a Conveyor Loading Point 18

Uncle Sam's Tin Smelter 22

The Bureau of Mines in the War Program 24
By DR. R. R. SAYERS

Electric Power Distribution for Open-Pit Mines and Quarries—Part I 28
By J. E. BORLAND

Coal Division Reports
The Coal Division Committee on Safety 35
By L. C. CAMPBELL

Wheels of Government 39

Cracking Hard Rock on "The Hill" 41

Personals 43

News and Views 45

Manufacturers Forum 54

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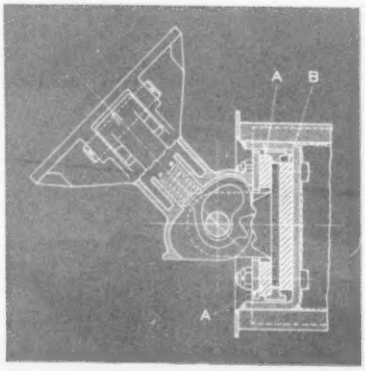

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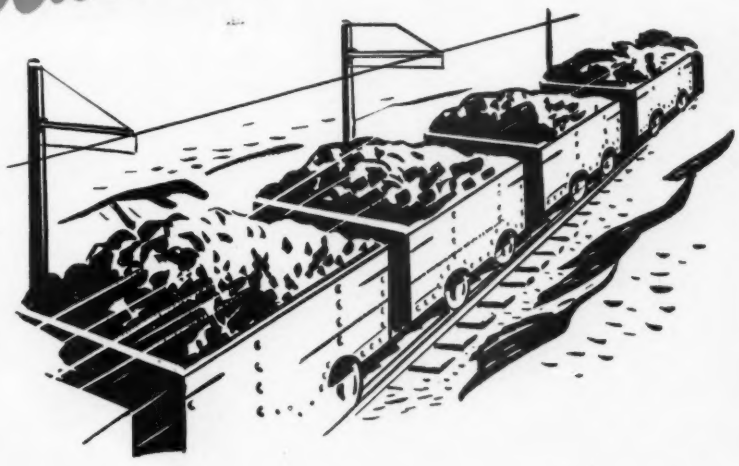

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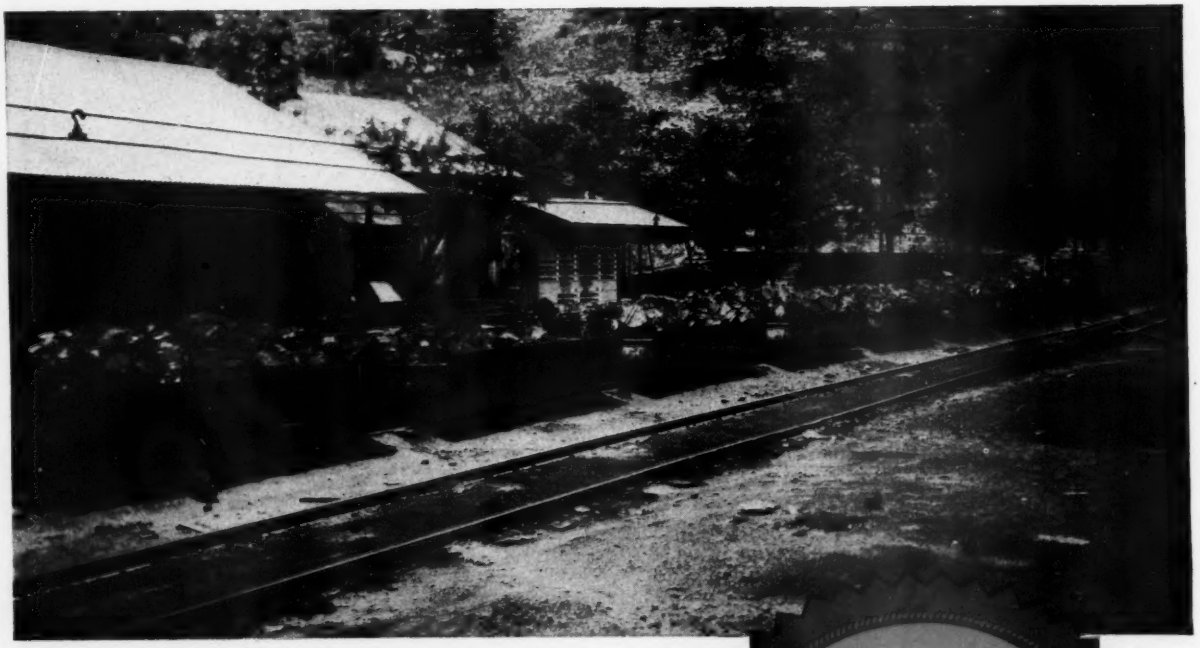

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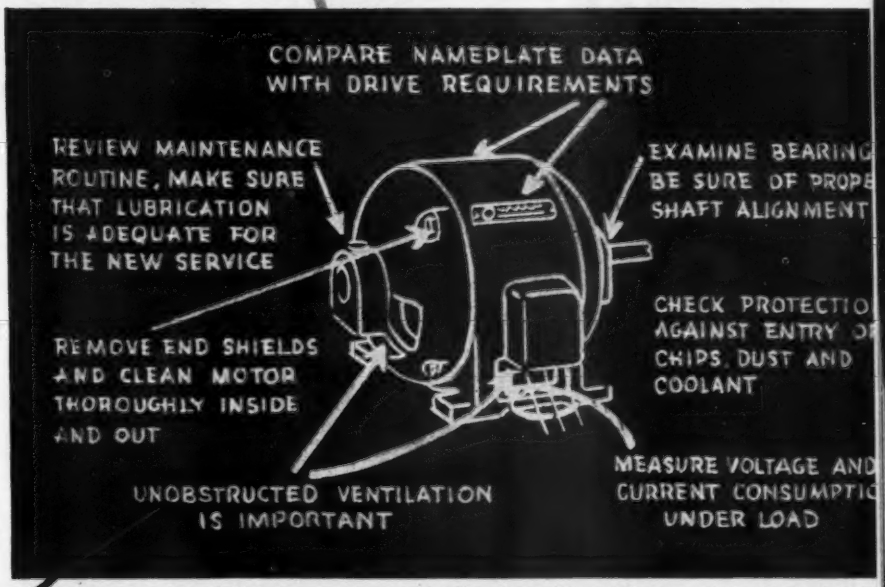
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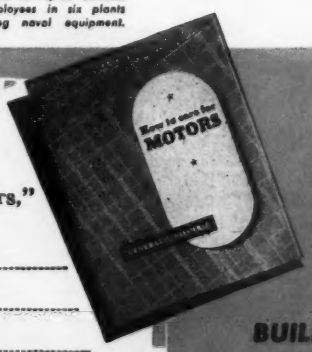

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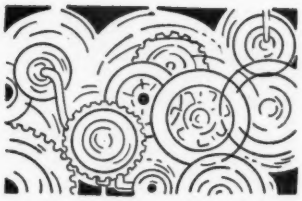

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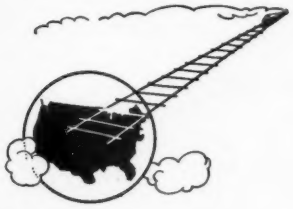

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MINING
CONGRESS JOURNAL
Published for the Entire Mining Industry by The American Mining Congress
H. C. CHELLSON, Editor
Volume 29 JANUARY, 1943 Number 1

Why Not a Director of Mining?

As 1943 takes over its many responsibilities, there is a feeling among many in the mining industry that various branches of the war agencies could be helped considerably by the services of a wartime director of mining. Selection of such a man obviously should be confined to someone of broad, practical experience, well known to the entire industry.

Problems involving priorities, production and manpower will multiply in 1943, and with the war making its requirements felt with each passing month, the broad picture of the needs of the complex mining industry may also come in for some unusual demands or adjustments. A war minerals director of mining could coordinate, clarify, and speed factual information through a common clearing house for the numerous government agencies responsible for supplying the various essential metals and minerals. Such an official could also intelligently help guide necessary post-war adjustments for an industry that will have depleted a large part of its present resources.

Home Front Casualty List

It IS an astounding fact that more American workers were killed on and off the job from the time of Pearl Harbor to November 15, 1942, than were lost on the war fronts. During that time the casualties in the United States armed forces totaled 5,694 killed, 3,435 wounded and 39,827 missing or prisoners, whereas 44,500 workers were killed and 3,800,000 injured. Can it be said we have permitted the Axis to enjoy this measure of success in our total war by mere carelessness on our part? Naturally, this question obtains only in part, because there are many more millions of workers than front-line fighting men, but nevertheless the facts are startling, and the Army, Navy, the National Safety Council, Federal and State Safety Divisions, workers and industry have blood in their eye and are going to do something about it.

Since Pearl Harbor, many inexperienced young and older men have found jobs in the mines, and much time and effort has been devoted instilling into these new recruits the importance of safety first underground, as well as on the surface and in the plants. Every metal, non-metallic and coal mine operator, foreman and experienced miner, will join in the national effort and contribute his share in stopping preventable accidents.

For several months the Coal Division of the American Mining Congress has been organizing an aggressive and active Safety Committee. The Committee will make studies of the results of safety methods, in use or proposed, in the coal mining industry, and will make available to the industry the conclusions drawn from these studies. The objective is to help operators in their special problems of accident prevention. A list of some of the studies to be undertaken appear in the Coal Division Reports of this issue. The importance of this work and the need for full cooperation of coal mine operators cannot be overemphasized, and it is gratifying to know that many companies have seized this added opportunity to aid in the campaign to reduce casualties on the home front.

It's Only the Beginning

In IIIS message to Congress on Jauary 6, President Roosevelt reviewed achievements of the 1942 war production. He paid tribute to our fighting men for their heroic deeds in taking the offensive and to workers and to industry for their spirit of cooperation in overcoming wartime difficulties and fulfilling such a notable measure of the desired 1942 production blueprints. Speaking as he did, in terms of great numbers of airplanes, tanks, fieldpieces, machine guns and rounds of ammunition, it follows that immense quantities of coal, iron, copper, zinc, lead and all other metals and nonmetallics supplied by the mining industry helped make these 1942 achievements possible.

To the coal miner, for instance, it meant that for every 12 tons of coal he produced in 1942, six tons of steel could be provided for tanks and ships or 10,000 hand grenades sent c.o.d. to Japan, Germany and Italy. To the zinc miner it meant that for every two tons of low-grade zinc ore he mined, 240 pounds of cartridge cases containing 30 percent zinc were made possible. To our fighting men, the 1942 achievements meant the assurance of tools of war and equipment.

In the first year of war we have performed incredible tasks, but this is no time to "take five" on our long march up the steep hill to Victory. Our tremendous pace of production must not only be maintained, but accelerated in directions best known to military authorities. We know that coal production must increase this year and that supplies of copper, zinc and other metals are in ever-increasing demand. It is a job that will force many dislocations and demand even greater sacrifices on the part of every person in the country.

To our Nation the war production achievements of 1942 are only the beginning, but to the enemy they bring jitters and foreboding, which can mean but one thing—the beginning of the end.

Treated Timber at Isabella Mine

Standard timbering practices of Weirton Coal Company in Western Pennsylvania for long-life entries, and special methods used in unusual roof conditions.

METHODS FOR CONSERVING material and manpower are being applied in all operations of coal mining, but at this time major attention is being given to steel, copper, rubber and other critical materials. While timber in itself is not yet classed as critical, the day may come when it will be, but in any case, the deterioration of timber underground causes "critical" situations; failure of roof supports or track ties involve considerable labor for cleaning up and re-setting, to say nothing of the coal production loss resulting from delays to the mine operation. Pressure treatment will prolong the life of timber to several times the life of untreated wood; increased length of service reduces the labor for replacements; and it therefore follows that the use of preserved wood is a direct manpower conservation measure. The accompanying article illustrates a number of ways in which pressure-treated timber is serving the Isabella Mine of Weirton Coal Company by maintaining the main haulage entries and aircourses, and in the installations described, the crossbars, beams, lagging and track ties are treated with chromated zinc chloride, impregnated under pressure with a net retention of ¾ lb. per cubic foot of timber. The photographs were furnished through the courtesy of Koppers Company, Wood Preserving Division.

Figure 1

This view of the West Main Haulway illustrates what is considered an exceptionally safe method of timbering, inasmuch as there are no posts that can be knocked out in case of car or locomotive derailment, and the "rib-hitch" plan shown here is, in general, being extended as fast as possible to all of the main haulage in Isabella Mine. The primary support consists of 5 ft. lengths of 60 lb. rail set horizontally in holes or "hitches" drilled 3 to 4 ft. deep in the coal near the top of the seam; these rail "pins" are concreted in place with about 12 in. projecting out from the rib to form the support for 60 lb. rail stringers paralleling the heading, which in turn support the roof crossbars. The crossbars are 6 in. x 6 in. treated wood with similarly treated wedges, cap pieces, and lagging where necessary, and in some cases wood stringers are substituted for the 60 lb. rail. Each stringer is generally supported at three points; this feature is particularly watched at wide openings, like the breakthrough to the left and right shown in the illustration where concrete block piers are used. Here the support is carried over at least three of the piers and also on pins, where possible, so that in case one or two of the piers happen to be knocked out, the timbering will still be held in place. The track has 60 lb. rail, thermit welded at the joints and laid on 5 in. x 7 in. pressure treated wood ties.

Figure 2

It is entirely possible that a further shortage of steel may occur which may prohibit—or at least greatly restrict—its use for mine roof supports. In order to study the practicability and service life of an all-wood rib-hitch method, an experimental section was recently installed on the West Main Haulway elminating steel

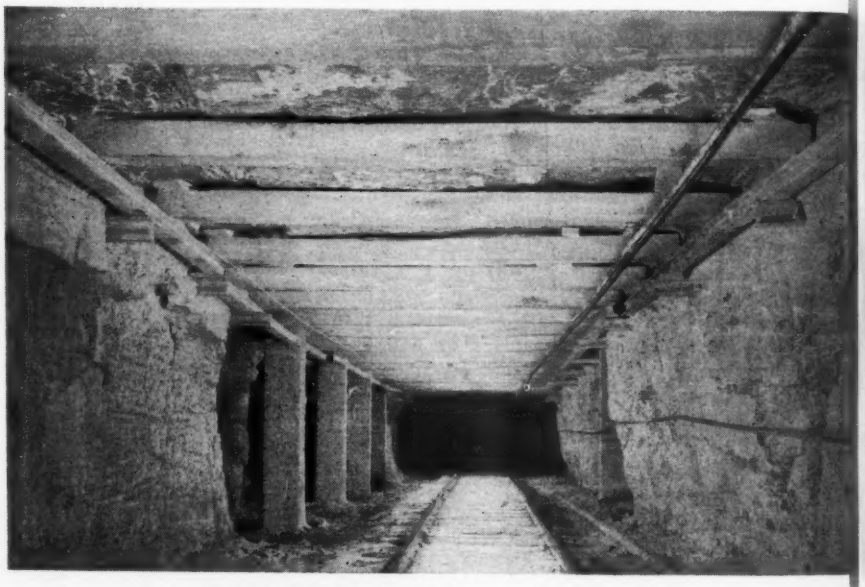


Fig. 1. Rib hitch roof support with steel and timber

Fig. 2. Rib hitch roof support with all timber

Fig. 3. Piers are required for severe roof conditions

and substituting treated wood for the pins, crossbars and stringers. In this illustration, wood pins, sawed from 6 in. diameter posts, have replaced the customary 60 lb. rail pins but are similarly set 3 to 4 ft. deep in the rib and wedged in place.

Figure 3

Bad roof conditions on this section of West Main Haulway made it necessary to build concrete block piers to hold the ribs. Beams and headers are 85 lb. steel rails and the cribbing above the headers consists of 3 in. x 5 in. and 4 in. x 6 in. mixed hardwood, impregnated with chromated zinc chloride. The haulage track ties are 5 in. x 7 in. mixed hardwood, similarly treated.

Figure 4

This important intersection on the West Main Haulway has heavy roof and was, consequently, timbered with 85 lb. rail crossbars on 85 lb. stringers; to eliminate posts, the crossbars were supported on 60 lb. or 85 lb. pins set in the ribs 3 to 4 ft. deep and concreted in place. The lagging and cap pieces over the top of the crossbars are pressure treated, as are the 5 x 7 ties under the 60 lb. track.

Figure 5

A special method for a permanent roof support was needed in the main sump entry which will be used to accumulate drainage water and will be pumped off shift. These headings have a soft fire clay bottom; consequently, the conventional three-piece set or even a four-piece set would not be practical due to the heaving of the bottom, so the "rib-hitch" method is used.

Fig. 4. A main haulage intersection

Fig. 5. Posts eliminated in a sump entry

Sections of 80 lb. rail 5 ft. long are cemented into hitch holes, drilled into the ribs; longitudinal stringers are placed on these rail supports and, on top of the stringers, crossbars are wedged against the roof. Cap pieces and wedges are used to make the installations tight. The stringers, crossbars, cap pieces and wedges are sawed native Pennsylvania hardwoods, which are first air-seasoned and then pressure treated with preservative. While this method of timbering costs somewhat more than the conventional three- or four-piece sets, it is believed that this installation will satisfactorily support the roof for the life of this portion of the mine.

Figure 6

This view was taken in the main aircourse, where it is especially necessary to keep the roof from caving;

in addition to being a main airway, the entry is also used as a walkway for pumpers and firebosses, and for the installation of pipe lines, one of which can be seen in the lower right. Timbering, including blocks and cap pieces, is all treated with chromated zinc chloride; crossbars are 6 in. x 6 in. x 11 ft. 9 in., while posts are 6 in. minimum diameter. In addition to the posts on the rib, in some places the excessive weight made it necessary to center-post the crossbars as illustrated, but it will be noted that these are set slightly off-center to make a better traffic way and to permit the moving of pumps, if necessary.

Figure 7

Another view of the main aircourse shown in Figure 6 illustrates timbering in a particularly bad roof condition where there has been a heavy fall. In this section, 60 lb. and 85 lb. steel crossbars have been used, with treated wood lagging and treated posts.

Figure 8

The Hustead Mine slope bottom has been abandoned for over 12 years but it will soon be tapped by Isabella Mine and the two slopes will, thereupon, become intake airways. Both of the slope bottoms were driven rather wide originally and, during the years since the Hustead Mine was abandoned, considerable house coal was robbed from the pillars, to the point where the width of unsupported roof was as much as 50 ft. in places. Fortunately, the roof was an excellent sandstone at this location so only thin slabs had fallen here and there. As it was very important to keep this slope bottom open for ventilation, and as it was felt that intake air would cause the roof to deteriorate rapidly, a total of approximately 90 cribs were erected.

Fig. 6. Center posts strengthen cross bars in airway

Figure 9

The service haulage track in the mechanical loading sections use Armoored ties, as illustrated by this photograph taken on No. 4 Butt, 48 North. These are made of 3 in. x 5 in. sawed oak bases, preformed and bored and impregnated with the standard retention of ¾ lb. chromated zinc chloride per cubic foot of timber. After treatment, the assembly is completed by bolting a steel mine tie to the treated oak base with four leak-proof bolts and grip-holding nuts.

In December, 1940, an order of 2,500 Ar-moored ties was purchased similar to those previously used, except that they were made with a 2 in. x 5 in. oak base instead of the 3 in. base. After two years of use the Weirton Coal Company has demonstrated that the 2 in. Ar-moored ties are rugged enough to do the same work as the 3 in. ties and at a saving of 1 in. in height and 12 lbs. in weight.

Fig. 7. Extra timbering required where fall has occurred

Fig. 8. Cribs needed where pillars were weakened

Fig. 9. Service haulage track in mechanical loading section

A Scientific Solution of the Multiple Shift Problem*

The author offers some suggestions on arranging working hours and scheduling rotation of shifts

By PROF. NATHANIEL KLEITMAN

Department of Physiology, University of Chicago

THE PRESENT EMERGENCY has necessitated the employment of two or three, or even four, shifts in carrying out the President's request to keep the plants going 24 hours a day, seven days per week. The introduction of multiple shifts has brought up a number of problems with respect to work at unusual hours and the necessity of adapting one's other daily activities to the new schedule.

When a nightworker complains of his inability to sleep well in the daytime, he unintentionally conveys the information that he is very sleepy at night, when he should be wide-awake at his bench or machine. This is because sleep and wakefulness are mutually complementary, constituting the two phases of the cycle of existence, like the trough and crest of a wave. The sleepiness of the unhappy night worker is not only due to his working during the customary hours of sleep, but also to the fact that he slept poorly the day before.

At birth we spend most of our time in sleep, and there is no evidence of any 24-hour cycle in our bodily activities. We are, however, born into a world which is run on the routine of daytime work, evening leisure, and night sleep, and we very early in life are subjected to an enforced schedule of hours in conformity with the habits of our elders. As a result, already in the second year of life we have a well-established 24-hour or diurnal cycle of existence.

Instead of a normal body temperature, we have a temperature range, varying for different people and for the same person at different times. This range is about 1, 2, or even 3 degrees F. over a 24-hour period and the change in body temperature from hour to hour is such as to create what we call a 24-hour body temperature curve. Under ordinary routine conditions of existence, the peak or plateau of the temperature curve is reached some time during the afternoon, usually between 1 and 7 p. m. At that time our efficiency is greatest. The minimal body temperature is reached during the early morning hours, somewhere between 2 and 5 a. m. If one stays awake overnight, those are the hours of worst inefficiency and greatest difficulty of remaining awake. When one adjusts himself to a new routine of existence, with other than customary hours of sleep, work, meals and leisure, one gradually acquires a body temperature curve, with the highest efficiency and less sleepiness during the new activity hours and just the opposite during the new sleeping hours.

Several Weeks Necessary to Make Adjustments

A variety of physical and mental tests have demonstrated that hardly anyone is at his best immediately on waking up in the morning. In fact, performance at that time may be as poor or poorer than just prior to going to bed the night before. However, from this low level of performance, one shows a gradual improvement reaching a peak or plateau of greatest efficiency sometime between noon and evening. Beyond that, efficiency again falls off, and at a certain hour, in people with regular habits, a state of drowsiness develops, and the individual usually retires at that time. If, however, one is kept awake during the entire night, he will show an increased progressive drop in performance between 2 and 5 a. m., but from then on will show an upward turn so that at the time of his usual awakening, his performance will be nearly as good as it was at the bedtime the night before. Because the 24-hour cycle of sleep, work, meals and leisure is not inborn, but individually developed by following a definite routine, it can be displaced forward or backward by faithfully following a new routine.

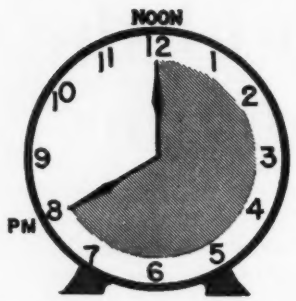
The application of these facts to the solution of the multiple shift problem has two aspects: (1) rotation or maintenance of shifts and (2) shift distribution or timing.

(1) It takes several weeks for a new 24-hour sleep-work-meals-leisure cycle to be properly established. Such achievement is wholly impossible under the system which prevails in some establishments of weekly or bi-weekly shift rotation, because the individual is not given a chance to adapt himself to a new routine. He essentially remains on the customary cycle of daytime work and night-time sleep. This makes him dislike work at odd hours. It causes him to be sleepy at a time he should be wide awake and wakeful when he should be sleeping; it leads to a decrease in production rate and a greater tendency to accidents. The way to overcome this effect is to keep each worker on a given shift for extended periods of time. Since rotation of shifts is very often adopted as a measure of fairness to all workers, the principle of equality of treatment can be preserved by having the workers change shifts once in several months, instead of weeks, or even days. The change in shifts can be staggered and made to coincide with short periods of vacation, in line with the suggestion that vacations should be distributed around the entire calendar year, instead of concentrated during the summer months. Where the workers themselves prefer it, the maintenance of "steady" shifts, with no rotation whatsoever, can be accomplished with due regard to seniority rights. Whether the shifts are "steady" or rotated, some effort should be made to modify community life to the extent of making leisure activities at other than customary hours possible.

(2) It is clear enough that a person working from midnight to 8 a. m., which is the customary night shift, makes his new work period coincide almost completely with his old sleep period. It is easier to adjust one's self to another shift timing in which the displacement of the cycle is smaller. Taking, for example, three eight-hour shifts, the following is suggested:

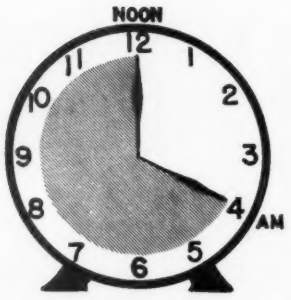
Red (Sunset) shift. Working hours from noon to 8 p. m. Evening and

* Presented at seventh annual meeting of Industrial Hygiene Foundation, Pittsburgh, November, 1942.



RED (Sunset) shift. Working hours from noon to 8 p.m. Evening and early night free for leisure activities. Sleep from 1 or 2 to 9 or 10 a.m.

WHITE (Victory) shift. Working hours from 8 p.m. to 4 a.m. Sleep from about 5 a.m. to 1 p.m. Afternoon and early evening free for leisure



BLUE (Dawn) shift. Working hours from 4 a.m. to noon. Leisure in the afternoon. Sleeping from about 7 p.m. to 3 a.m.

early night free for leisure activities. Sleep from 1 or 2 to 9 or 10 a. m.

White (Victory) shift. Working hours from 8 p. m. to 4 a. m. Sleep from about 5 a. m. to 1 p. m. Afternoon and early evening free for leisure.

Blue (Dawn) shift. Working hours from 4 a. m. to noon. Leisure in the afternoon. Sleep from about 7 p. m. to 3 a. m.

This shift timing has a number of advantages. One of the distinct advantages is the relatively small displacement of the customary sleeping hours, as no one is compelled to sleep in the afternoon hours, when it is hardest to sleep. Another advantage is that it also makes shift changing fall at hours which are not general community rush hours.

The *Red* shift will appeal to young unmarried men and women who like to have their recreation late in the evening as it would enable them to stay up to or beyond midnight and sleep later in the morning.

The *White* shift will appeal to middle-aged individuals whose social life has altered. As their children have all grown up they would not be disturbed while sleeping during the forenoon hours. They would have the afternoon free as they would not be due to begin work until 8 p. m.

The *Blue* shift fits in very well with the schedules of families of the intermediate age groups, where there are small children. The father could go to bed early in the evening at the children's retiring time. He would return from work shortly after noon and have the afternoon free.

With five eight-hour working shifts per week, the weekly holiday of two days may have an upsetting effect on the establishment and maintenance of the displacement cycle, in that it is too much to expect workers to stay up during the odd hours which they devoted to work during the five days preceding. One answer to this problem is to decrease the weekend break to one day, and the 48-hour six-day week is coming, where it has not yet been adopted. The effect of the common tendency to revert to "community" sleeping hours on free days is minimized, if the sleeping hours on work-days are displaced in one direction or another only four hours, instead of eight (as necessary under the graveyard shift system). Another solution of the weekend break problem is to have the workers continue without interruptions on a seven-day per week basis for a number of weeks and then be given one week's vacation, but that is a matter that has to be settled locally, with the cooperation of the workers themselves, and is certainly more feasible in certain types of work than in others.

In special situations an acceptable solution of this problem is to institute four six-hour shifts, each worker putting in seven days per week, or a total of 42 hours. After 20 weeks of work one would thus put in 840 hours which is the same number that he would put in in 21 weeks at 40 hours per week. He would then have earned and receive a week's vacation, and if rotation of shifts is adopted, the change can be made after the week's vacation. By having 20 twenty-firsts of the whole force working, one twenty-first can be off on successive weeks. With the four-shift arrangement, the distribution could be as follows:

A. The Red shift: working hours 3 p. m. to 9 p. m.; sleeping hours as in the Red eight-hour shift.

B. The White shift: working hours 9 p. m. to 3 a. m.; sleeping hours as in the White eight-hour shift.

C. The Blue shift: working hours 3 a. m. to 9 a. m.; sleeping hours a little earlier than in the Blue eight-hour shift.

D. The Gold (Sunshine) shift: working hours 9 a. m. to 3 p. m.; sleeping hours, as usual, at night.

Some industries may find it impossible to run their machinery continuously and may have to adopt two 10-hour shifts. These shifts could be distributed as follows:

A. The early shift from 4 or 5 a. m. to 2 or 3 p. m.

B. The late shift from 2 or 3 p. m. to midnight or 1 a. m.

By this arrangement no one would be expected to work during the early morning hours of greatest inefficiency. The shifts could be "steady" or of infrequent rotation.

In sum, the scientific solution of the multiple shift problem is not bound up with the number of shifts and the duration of each. The important elements are a minimum displacement of the normal cycle of activity and a sufficient time on the odd schedule of hours to enable the individual to adjust himself by not only developing, but also keeping the newly established cycle.

Lowering the day shift

LEAD—Saver of Critical Materials

EVER SINCE the Bureau of Industrial Conservation of the War Production Board several months ago placed lead in the group of materials available in sufficient quantity to be used as a substitute for more critical materials, the WPB, the Army and Navy officials, as well as industry, have been searching diligently for uses of lead that would relieve more critical materials. Lead, incidentally, is the only common metal classified in the least critical group. Already considerable progress has been made and more will undoubtedly result as the country becomes more fully aware of the current availability of lead.

"There is relatively more lead in relation to demand than there is copper, tin or zinc. Because of the desperate shortage of these metals, WPB now recommends that lead be substituted for these other critical metals wherever possible. This does not mean that we should try to use as much lead as possible. Substitution is the thing, not just consumption."

—ERWIN VOGELSANG, *Chief, Tin and Lead Branch, War Production Board.*

The use of lead to save critical materials falls naturally into two categories. First, there are many purposes for which lead is normally used to a greater or lesser extent in competition with other materials now critical, for example, lead in plumbing. The more extensive use of lead now as service, soil, waste and vent pipe, flashings and shower pans saves copper, brass, zinc, iron and steel. In this class also fall the greater use of lead for sheet metal work on buildings, such as flashings and gravel stops. Lead-base bearing alloys are rapidly supplanting tin-base alloys in ship construction, diesel engines and many other places. Lead-base die-casting alloys are supplanting zinc-base alloys for many purposes when high strength is not important but where good casting qualities are. The lead-base alloys, in addition, are generally superior for corrosion resistance.

Lead pipe and tank linings are taking the place of rubber in many industrial operations because of lead's corrosion resistance. Lead gaskets are, in many instances, proving superior to rubber gaskets used for a multitude of purposes. Lead collapsible tubes have largely displaced those made of tin and aluminum, and lead foil laminated wrappings are finding wide use to take the place of packages made of more critical materials. Lead coatings are saving much zinc, tin, cadmium and nickel, formerly used to protect iron and steel products.

In the paint field, considerable savings of critical materials are also possible through wider use of lead pigments. For metal priming, red lead and blue lead can conserve zinc and chromium. For finish coats on metal and for wood painting, pure white lead paint eliminates the need for using zinc.

In addition to the class of replacements just described, some are entirely, or almost entirely, new. Lead alloy name-plates, hard lead drum trap covers and rings, and water closet floor flanges have been developed to take the place of brass. Lead alloy couplings are being employed in place of copper and bronze on certain types of cement-asbestos pipe. Lead foil is finding use as a wrapping in a number of new fields such as the rapidly growing dehydrated food industry. Metal parts for mechanical pencils are now being made of lead alloy.

It is possible here to mention only a little of what is being done with lead to help relieve critical shortages of other materials, but this brief summary may help to suggest to others how they can use lead to aid the war effort. It is the duty of every industry, trade and government agency to employ the least critical materials that will do their jobs properly. If any one believes that he can use lead at the present time to save some of the highly critical materials, the Lead Industries Association, 420 Lexington Avenue, New York, N. Y., will be glad to assist with information and advice about the properties and uses of lead.

SOME LEAD USES TO SAVE CRITICAL MATERIALS

Use	*Material Saved*	*Recommended*
Bearing metal	Tin-base	Lead base
Chemical tank linings, and pipes	Rubber	Lead
		Lead alloy
Closet floor flanges	Brass	Lead alloy
Collapsible tubes	Tin, aluminum	Lead
		Tin-coated lead
Die castings	Zinc-base	Lead base
Drum trap covers and rings	Brass	Lead alloy
Fire extinguishers	Copper	Lead-coated steel
Foil	Tin, aluminum	Lead
Gaskets and washers	Rubber	Lead
Instruction plates, name plates, etc.	Brass, iron, steel	Lead alloy
Mechanical pencil hardware	Brass	Lead alloy
Metallic coatings	Zinc, cadmium, chromium, nickel	Lead coating
Paint, white and tinted	Zinc oxide	White lead
Paint, metal protective	Zinc chromate	Red lead
		Blue lead
Plumbing pipes and fittings	Copper, brass, galvanized iron and steel, cast iron	Lead
Roofing, flashing, gravel stops	Copper, galvanized iron, terne plate	Lead Lead alloy
Storage batteries	Nickel, iron	Lead-acid
Solder	Tin, lead	Lead-Silver
		Lead-Silver-Bismuth
		Tin-Lead-Silver
		Lead welding
Water service pipe	Copper, brass, galvanized iron and steel, cast iron	Lead

A Coal Dust Collector for a Conveyor Loading Point

Description of an Installation and Tests Made at the Bargoed Colliery, South Wales, England

DURING the past few years the Monmouthshire and South Wales Coal Owners Association have taken special interest in the problem of mine dusts and when the war broke out it was decided not to discontinue this research. The account presented here is an extract of a recent report prepared by "The Coal Dust Research Committee" covering tests made on the performance of a coal dust collector at a conveyor operation.

The discharge point of a conveyor is unquestionably the place where coal dust clouds are raised into the air current in modern mining and the committee's investigation described here was made in the Conveyor Section of Seven Feet Seam at Bargoed Colliery. The mining system as shown in Figure 1 is longwall with face conveyors loading onto a main belt conveyor which, in turn, discharges into trams. A series of samples of air-borne dust were taken at various points along the belt conveyor and the amount of dust concentration at these points are shown in Graph No. 1.

It will be noticed from this graph that the amount of dust present per cubic foot of air passing the loader diminishes rapidly between the loader and a point about 80 ft. on the inby side. In this distance, a considerable proportion of the dust raised into the air current at the discharge point of the conveyor into the trams has been deposited, and as this disposition is by gravity, it is presumably the coarser particles of dust that have settled out of the air. The dust problem is most acute, and visibility is very bad as far as about 60 ft. from the loader; between that point and the coal face, the curve is very flat, which shows that the dust present is so very fine that it is capable of being carried along a considerable distance by the intake air current.

If, instead of being dispersed throughout the whole area of the roadway, this dust is passed into a tube, then it is possible to induce the coarser dust up to a point 80 ft. from the loader, to settle out by normal gravity dry disposition, while the finer dust capable of being carried a greater distance than 80 ft. might be allayed by wetting the dust particles in the tube by means of a mist projector or finely divided water spray. This is the principle of the dust extractor which has been designed and installed at the conveyor loader in the Seven Feet Seam at Bargoed Colliery.

Whereas a tube 80 ft. in length may be considered as being impracticable in the mine, it is possible that a shorter length of tubing might be equally as effective if it is fitted with a system of baffle plates. Baffle plates produce turbulence of the dust laden air, and act as buffers against which dust particles may strike and thereby have their momentum suddenly reduced so as to cause them to settle more quickly. By a suitable arrangement of baffle plates in the tube, it appears reasonable to suppose that the required length of 80 ft. of tubing might be appreciably reduced and almost similar results obtained.

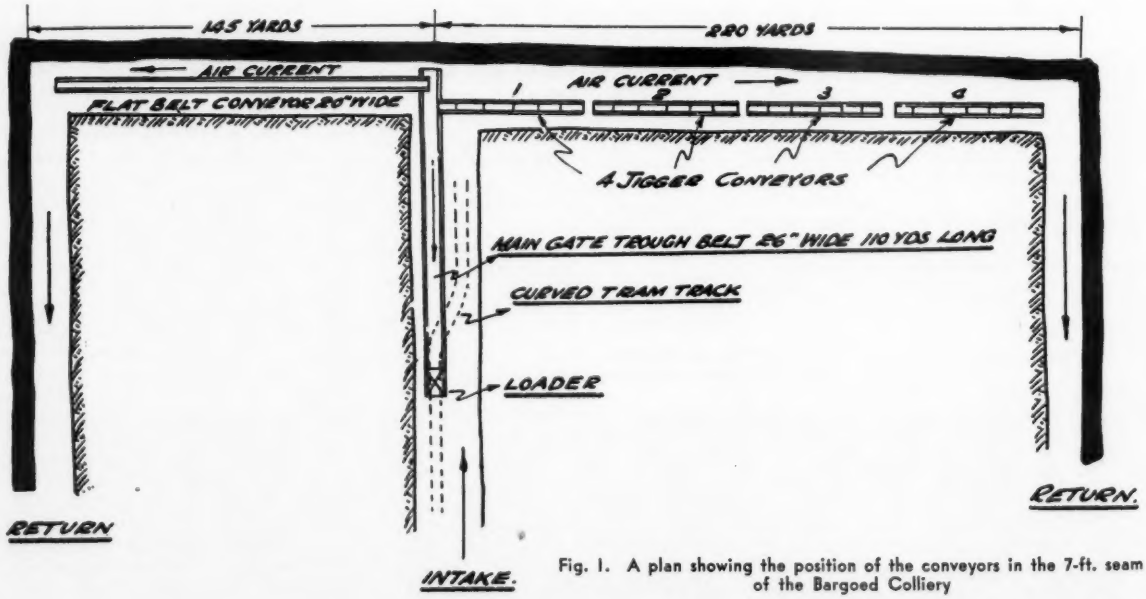
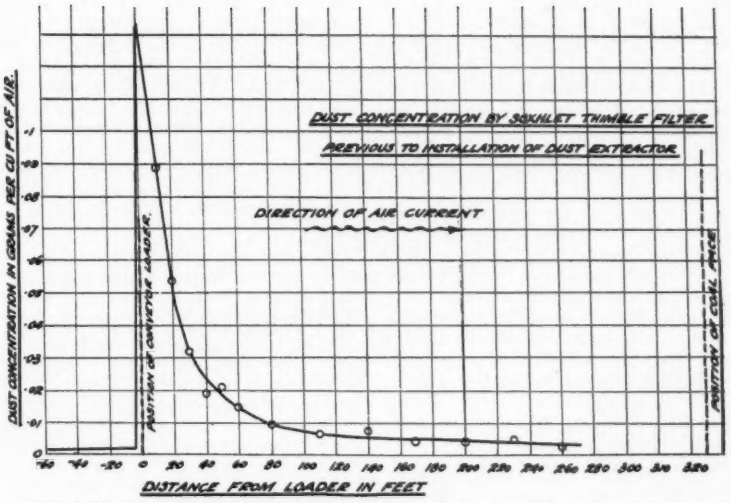


Fig. 1. A plan showing the position of the conveyors in the 7-ft. seam of the Bargoed Colliery

Design of a Dust Collector

A dedusting apparatus incorporating these principles of dry deposition of the coarse dust and wet allayment of the fine dust could be connected to the conveyor loader without in any way impeding the normal loading operations. It was therefore decided to have such a dust collector made in the workshop at Bargoed Colliery, and after a preliminary try out on the surface, to have it installed underground at the conveyor loading point in the Seven Feet Seam. Fig. 2 shows the general plan of the installation.

The suction end or inlet to the dust extractor, which is in the form of an expanded throat, fitting just below the lip of the loading chute, leads to the 20 in. diameter suction fan. This suction inlet forms a very important feature of the deduster, as it is the part which takes the place of any type of hood or cowl arrangement usually placed over the tram with all other types of dedusters applied to conveyor loading points. The expanded throat is much smaller and less cumbersome than a hood or cowl, and it has the advantage of being situated behind and below the lip of the conveyor discharge chute where it does not in any way interfere with the loading of trams. The weight of coal per tram is not affected, and the operator is allowed a full view of the


DUST CONCENTRATION IN GRAINS PER CU FT OF AIR.
DUST CONCENTRATION BY SOXHLET THIMBLE FILTER PREVIOUS TO INSTALLATION OF DUST EXTRACTOR.
DIRECTION OF AIR CURRENT
POSITION OF CONVEYOR LOADER.
POSITION OF COAL FACE
DISTANCE FROM LOADER IN FEET

Graph No. 1. A series of samplies of air-borne dust were taken at various points along the belt conveyor and the amount of dust concentration at these points is recorded in the above graph

then more likely to be brought into intimate contact with a particle of water in the mist.

The inlet tube is set about 6 in. above the top of the empty tram standing at the loader; this distance being necessary to ensure that it does not get damaged in any way from movement of the trams. Such a loading, can be clearly seen streamlining into the expanded throat of the inlet tube, while no dust is emerging from the far end of the apparatus. Even when the fan is stopped, there is an improvement at the loading point since the ventilating current drives a fair proportion of the dust made in the tram directly into the

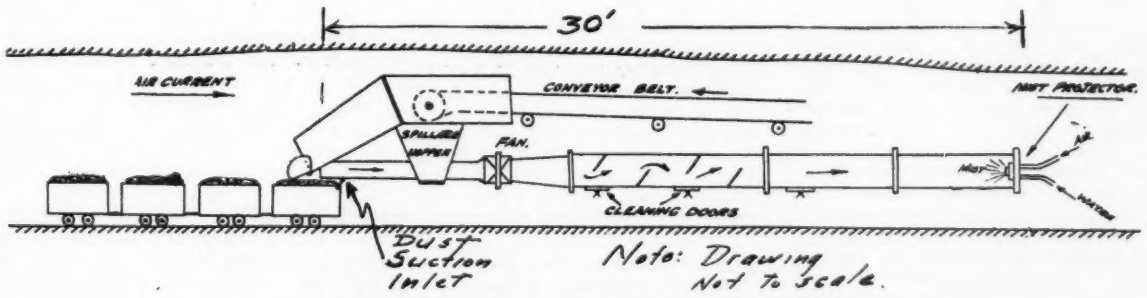


Fig. 2. Diagram showing dust extractor installation. Actual construction varies in minor details from this above diagram

loading operations. The entrance to the throat of the extractor is much closer to the point in the tram where the greatest dust cloud is raised than is possible with a hood over the tram. The throat opening faces the intake air current which helps to carry the dust into the tube, and the dust particles have not to be lifted against gravity as is the case with any type of hood arrangement.

The spray or mist projector at the discharge end of the tube is operated by compressed air and water through jets. The water need only be at low pressure, and only a small quantity is required to make a very effective mist. The most efficient way of allaying the dust is to have the mist blowing in opposition to the direction of the dust laden air, as every particle of dust is

height above the tram necessitates the inlet being fixed some distance away from the actual point where the coal leaves the edge of the chute to enter the tram, and in this distance, some of the dust cloud becomes dispersed into the air current and passes around the sides of the throat before it can be drawn into the tube. This difficulty was overcome by extending forward the sides of the expanded throat by means of small plates, while strips of old belting were hung loosely from the sides of these plates.

The dust extractor is now working quite well and producing a very considerable improvement in the amount of dust in the air between the loader and the coal face. Under normal working conditions at the loader, the dust cloud made in the tram when

expanded throat of the inlet tube. This improvement was quite marked as compared with the conditions prior to the installation of the plant. The inlet tube collects large quantities of dry dust, which have to be dealt with periodically.

Capacity of Suction Fan

In order to produce the required suction at the inlet to the dust extractor, it is necessary to draw in the dust laden air at the rate of at least 3,000 cu. ft. per minute, and to do this, a 20 in. diameter fan was used. The velocity of the air at the suction inlet is important. The main object of any dust collecting device is to collect only that dust which would be raised into the air current as a result of normal working conditions, and not to en-

deavor to dedust the coal as it passes from the chute into the tram.

If the inlet velocity of the dust laden air is too high, then it renders it more difficult to arrest the dust in the actual dust trap beyond the fan. The speed of the fan should be regulated so that the suction at the throat is just sufficient to take into the tube all the dust made in the tram when loading, but with the minimum velocity consistent with this condition. With proper regulation of the fan speed to give the most efficient inlet velocity, the suction part of the deduster up to the fan will prove to be the most effective and important feature of the design. At some point in the dust trap, the sectional area must be greater than the area at the throat of the apparatus, so that there is a drop in velocity which enables the coarser dust particles to settle out by dry deposition.

Mist Projector Used With the Dust Extractor

The mist projector is fixed in the extreme end of the outlet tube from the dust extractor so that it projects a cloud of mist against the direction of flow of the dust laden air. As the dust laden air has considerable turbulence on leaving the baffle plates in the tubes, the mist is also forced into a turbulent motion, and even the smallest particles of dust are brought into forced impact with a particle of water from the mist. The mist also keeps the sides of the tubes wet so that dust particles which strike the sides of the tubing become attached to it. A sheet of brattice cloth is hung up in direct line with the emerging mist and about 8 ft. away from the outlet end of the dust extractor. This becomes covered with a thick deposit of coal dust sludge.

When these improvements had been completed a series of sampling tests were made to determine the new efficiency. The results obtained are given in Table No. 1 showing comparisons with samples previously obtained without the dust extractor working, and they are represented in Graph No. 2. The efficiency of the dust extractor in reducing the amount of dust present in the air current behind the loader, is represented by the ratio of the areas below the two dust concentration curves. If the leakage of dust from around the spillage hopper, which has since been rectified, is ignored, there is 90 percent reduction in dust between the loader and a point 95 ft. on the inby side.

Procedure Recommended for the Reduction of Dust at a Conveyor Loading Point

At most of the conveyor loading points in the South Wales pits, a small open type of loading chute is used. The disadvantage of such a chute from the point of view of the amount of dust raised, is that all the moving coal in the chute and around the conveyor head is exposed to the air current and there are large dust clouds raised from all around the chute. These dust clouds rapidly become dispersed throughout the whole area of the roadway near the loader and it is extremely difficult for any kind of dust extractor to be applied to an open chute with any degree of success.

The types of dust extractors so far tried out in South Wales have employed some form of hood or cowl arrangement over the tram at the loading point but in every case investigated, the hood or canopy has proved a failure, and so far as South Wales is concerned, it should not be adopted. It prevents the men at the loader having a good view of the actual loading operations, and this is important as the way in which the chute is manipulated influences the amount of dust raised. The hood delays the changing of the trams, and it has the disadvantage of reducing the weight of coal per tram—a factor which is very important in the South Wales pits. Further, the dust made during loading has to be raised against gravity in order to enter the inlet tube of this type of dust extractor. In addition, the presence of a cowl is not conducive to safety.

Dust Suppression with the Bargoed Loading Chute

Great interest has been taken by the Powell Duffryn Colliery Company in the general suppression of dust produced by conveyors, and especially in regard to improvements in the general design of the loading chute. The one in the Seven Feet Seam at Bargoed Colliery is particularly well designed when considered from the point of view of dust suppression, and it is the best type of loading chute so far observed in South Wales during the investigations concerning dust problems. The outstanding feature is the quickness of action of the large compressed air operated door for closing the chute at the lower end. This enables the man operating the loader to have complete control over the coal passing into the tram; there is very little rolling or tumbling of the coal in the chute, as it is allowed to slide or flow gently forward into the tram.

It will be seen that there are several arrangements incorporated for reducing dust. All of these are very effective, and are simple in design and operation. The whole of the top of the chute is covered over completely by means of plates; strips of flexible belting are hung by means of hinges from the roof of the chute so as to prevent, as far as possible, the air current from raising dust from the coal in the chute and around the conveyor head. A spillage hopper is fixed below the belt roller and the point forming the angle of construction of the chute, and this collects the small coal and dust carried back by the underbelt. The general effect of such an enclosed chute is to concentrate the dust in a small dense cloud just above the top of the tram standing at the loader. This dust cloud is carried forward by the intake air current, but it can now be more readily dealt with effectively by a dust collecting apparatus with its inlet placed in the line of the dust cloud and just above the top of the empty tram; i. e., it can be dealt with before it has the chance of becoming dispersed into the general body of the air current.

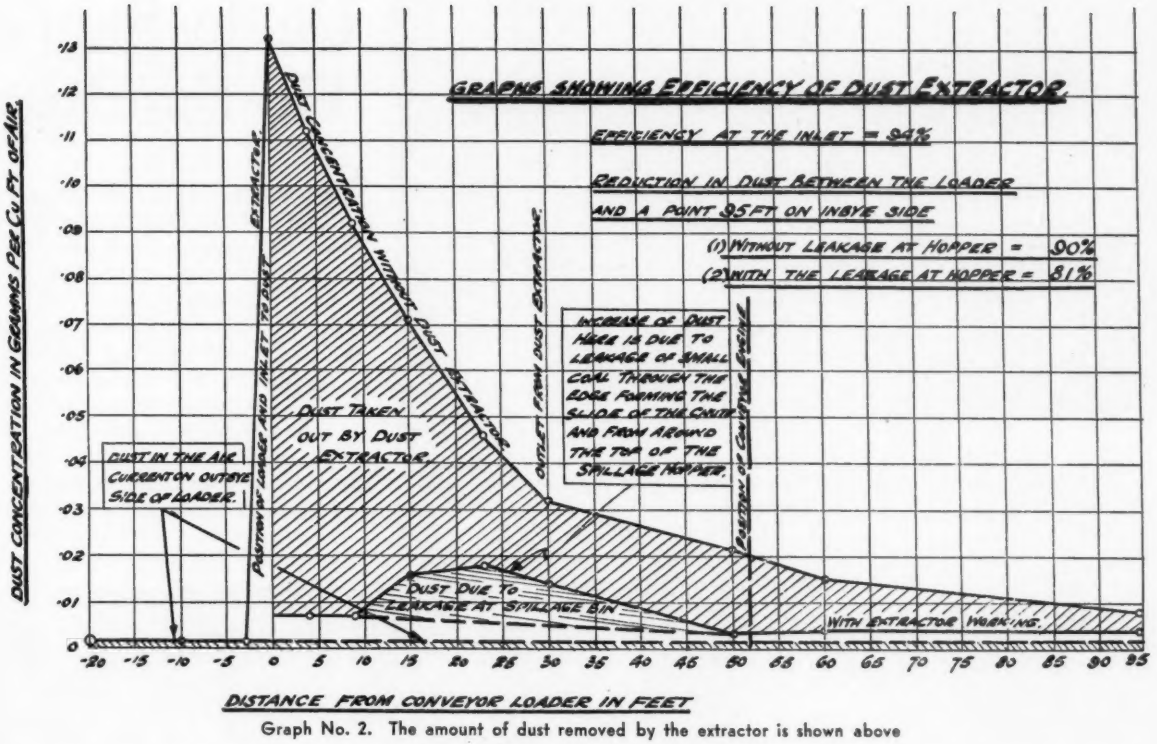
TABLE NO. 1

EFFICIENCY RESULTS FOR DUST EXTRACTOR AFTER IMPROVEMENTS

Distance from Loader	Without Extractor Working Grams per cu. ft.	With Extractor Working Grams per cu. ft.	Percent Reduction of Dust	Remarks
At Inlet	0.132	....	..	.....
4′	0.112	0.007	94	At side of dust extractor throat.
9′	0.092	0.007	93	At side of the spillage hopper.
15′	0.071	0.016	77	On inby side of the spillage hopper.
23′	0.043	0.018	61	Inby of spillage hopper.
30′	0.032	0.014	56	.....
50′	0.0216	0.003	86	.....
60′	0.0150	0.004	73	.....
95′	0.008	0.004	50	.....

Summary of Results

Total weight of dry dust and wet sludge collected = 299.6 lbs.
Total weight of dry dust and wet sludge per ton of coal = 15.44 ozs.
Total weight collected when converted to dry dust = 225.1 lbs.
Weight of dry dust collected per ton of coal - - = 11.61 ozs.


GRAPHS SHOWING EFFICIENCY OF DUST EXTRACTOR.
EFFICIENCY AT THE INLET = 94%
REDUCTION IN DUST BETWEEN THE LOADER AND A POINT 95 FT. ON INBYE SIDE
(1) WITHOUT LEAKAGE AT HOPPER = 90%
(2) WITH THE LEAKAGE AT HOPPER = 81%
DUST CONCENTRATION IN GRAINS PER CU. FT. OF AIR
DUST CONCENTRATION WITHOUT DUST EXTRACTOR
DUST TAKEN OUT BY DUST EXTRACTOR.
DUST IN THE AIR CURRENT ON OUTSIDE SIDE OF LOADER.
POSITION OF LOADER AND INLET TO DUST EXTRACTOR.
OUTLET FROM DUST EXTRACTOR.
INCREASE OF DUST HERE IS DUE TO LEAKAGE OF SMALL COAL THROUGH THE EDGE FORMING THE SLIDE OF THE CHUTE AND FROM AROUND THE TOP OF THE SPILLAGE HOPPER.
POSITION OF CHUTE AT SPILLAGE
DUST DUE TO LEAKAGE AT SPILLAGE BIN
WITH EXTRACTOR WORKING.
DISTANCE FROM CONVEYOR LOADER IN FEET

Graph No. 2. The amount of dust removed by the extractor is shown above

It was only after the installation of the dust extractor at the loader at Bargoed Colliery, that some very big leakages in the chute became apparent, and a considerable amount of work was done to stop them. With the introduction of such an enclosed chute, the dust problems at many of the South Wales loading points would be very greatly reduced.

An Improved Type of Dust Extractor

The dust extractor made in the mine workshop at Bargoed Colliery and applied to the conveyor loading point in the Seven Feet Seam, has been working for over six months and is still giving highly satisfactory results. Evidence that it is capable of arresting the large dust clouds raised during loading operations is afforded by the accumulations of dry dust in the throat of the expanded inlet tube, and also by the thick deposit of coal dust sludge at the outlet end of the dust extractor tubes.

The dust extractor achieves the important objective of causing all the dust made in the tram when loading, to be concentrated in a tube of small area, where it can be more effectively dealt with than if it were dispersed throughout the roadway. At the same time, it must be realized that this dust extractor was the first to be made, and was essentially an experimental one, and as the result of experience gained in making and testing it, certain improvements could be made, and these can be embodied in the new installations wherever the dust extractor is intended to be installed. The same general principles in the design can be adopted for allaying the dust, but the size and shape of the apparatus can be modified to suit the new conditions. The improvement would chiefly concern the overall size of the apparatus, as this is the chief disadvantage of the experimental one tried out at Bargoed Colliery.

Equally as efficient results might be attained with an all-around reduction in the size of the dust trap, as the mist projector has proved capable of allaying dust when the mist is projected against the direction of the dust laden air. As the dust extractor is to be a component part of the conveyor loader, a reduction in size would be much appreciated in practice as it would greatly facilitate the work of moving it forward with the loading chute. The expanded throat or inlet tube must be wider than that of the tram at the loader, to ensure that all the dust is drawn in. The portion of the apparatus up to the position of the suction fan must be the same as before, but in the improved type of dust extractor there is a considerable reduction in the size and length of the tubing which forms the actual dust trap, the overall length of tubing beyond the fan being now only 19 ft. The box, 6 ft. long, and of section, 3 ft. by 3 ft., gives a big drop in the velocity of the air, so that the coarse dust will settle out in it. The resistance to the passage of the dust laden air will be considerably reduced in this improved type, so that a smaller size fan can be used.

The circular mist projector 8 in. in diameter with five jets, is suitable for use in the reduced size of tubes, and this smaller type of dust extractor will be less costly to make in the mine workshops.

Editor's Note: *The above article was abstracted from the first report, "The Design and Testing of a Dust Collector for a Conveyor Loading Point in an Intake Roadway," by the Coal Dust Research Committee of the Monmouthshire and South Wales Coal Owners Association.*

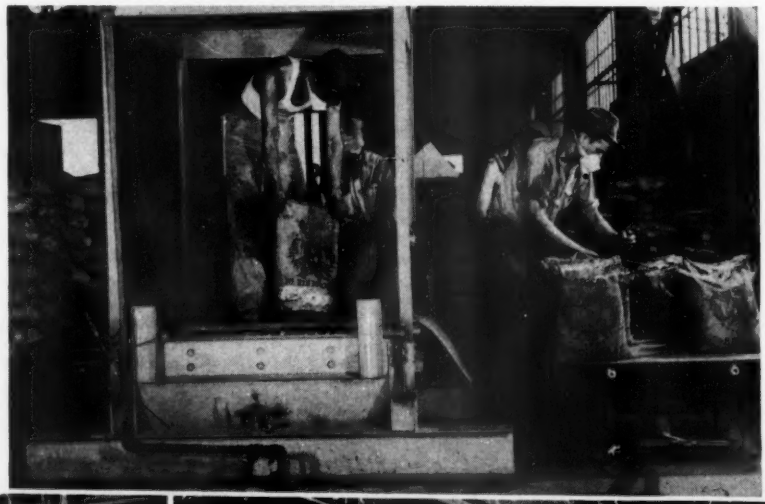
This report represents the results of the first eight months work of the Research Laboratory and the committee considers that it reflects great credit upon Dr. T. David Jones. Director of Research and Professor of Mining at the University College, Cardiff, Wales, and W. A. Terrell, underground investigator, and J. H. Griffiths, analytical chemist.

Fumes from the tin smelting furnaces pass through these large tubes to the 54,000-volt Cottrell precipitator units where the small amount of tin contained in the fumes is collected

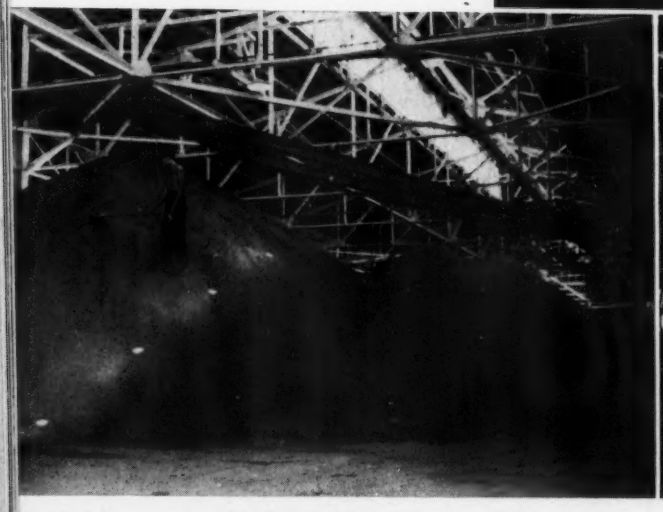
Uncle Sam's Tin Smelter

SOME DISTANCE from the heart of Texas, Uncle Sam has what is called the Longhorn Tin Smelter, the only one of large capacity in the Western Hemisphere.

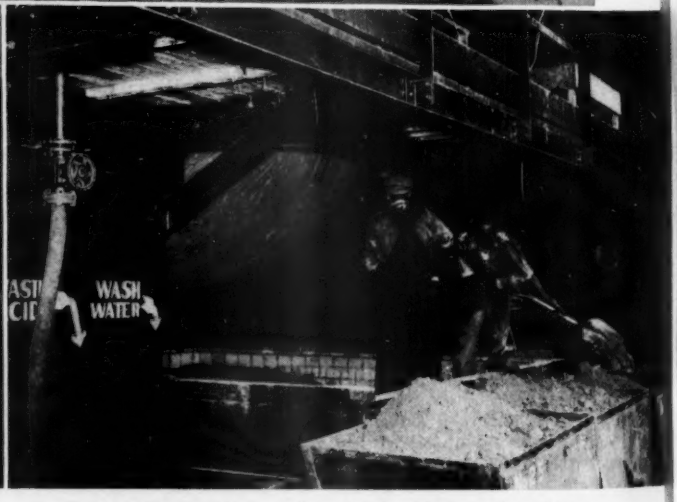
In 1941, Metals Reserve Company announced a contract with a subsidiary of the Billiton interests, of Holland, the Tin Processing Corporation, for the construction and supervision of the tin smelter, which is now completed and supplies tin for the Nation's war effort. The Dutch concern has had more actual experience in smelting refractory Bolivian ores than any other corporation and these photographs testify to the successful operation of the plant.



Emptying sacks of tin ore from South America onto a conveyor belt which feeds the crusher. One stage of crushing reduces the ore to a size suitable for smelting operations. Additional plant capacity is now being added to assure greater output in the near future

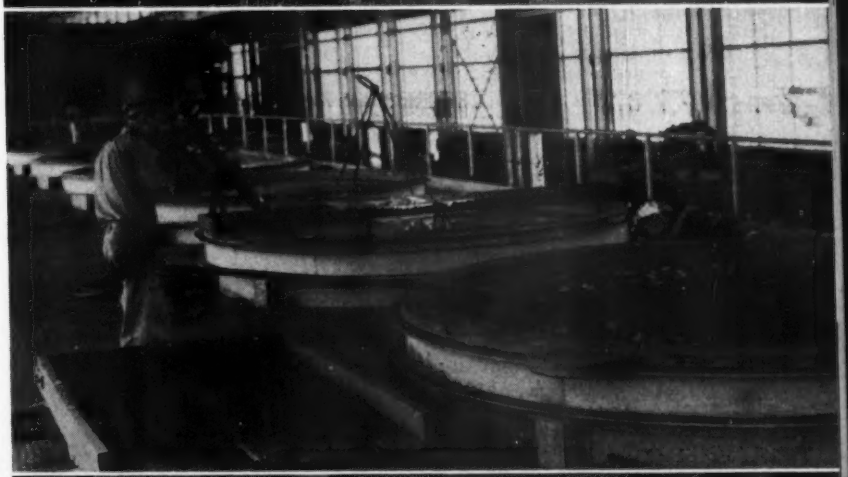


Crushed tin ore is stored in large stockpiles to await smelting and refining



Workers removing ore from the leaching and bleaching processes and loading it in cars for the furnaces

Tapping the furnace at the smelter where tin is extracted from the ore shipped from South American mines. The molten material is drawn off into 18-ton capacity buckets and conveyed to kettles where dross is removed



Kettles in the tin smelter. Here dross is removed from the surface. The metal is kept at a temperature of 750 F

Pure tin is molded into "pigs." The metal is usually kept at a temperature around 650 degrees while being molded. The metal is ready for removal from the form about 10 minutes after pouring

"Pigs" of tin are stacked in the warehouse. Each bar weighs about 80 lb. and has a value of about $41.60 at the present price of 52 cents per lb.

Official OWI photographs by Hollem

The Bureau of Mines In The War Program*

Many objectives involving the finding of strategic and critical minerals have been achieved

By DR. R. R. SAYERS
Director
U. S. Bureau of Mines

WHEN THE UNITED STATES was forced into the war nearly a year ago, the Bureau of Mines quickly shifted its activities from a defense status to a wartime footing. More than three decades spent in the conservation and development of the mineral resources of the nation enabled the Bureau to accomplish the transition smoothly, efficiently, and without delay. Many months before, it had laid the foundation for expediting the war work it was called upon to perform.

The war program of the Department of the Interior—presented within a few days after December 7, 1941—contains a list of objectives that have been assigned to the Bureau of Mines.

Important items are acceleration of the mine-to-metal cycle; increased output of domestic ores of the strategic, critical and essential minerals; enlarged production of processed minerals; and greater use of substitutes for materials formerly imported from abroad.

Promoting safety and efficiency in the mineral industries to conserve manpower and machinery is one of the vital tasks delegated to the Bureau. This is designed to protect from interruption the production of materials needed to equip the United Nations to win the war.

Increased production of helium for war purposes, the full utilization of the coal and petroleum of this country, finding of additional reserves of essential critical and strategic minerals, marshaling economic and statistical information for the use of all war agencies, and many other difficult assignments are entrusted to the Bureau.

All the facilities of the Bureau have been converted to effective prosecution of the wartime program. The tempo of this work has increased from month to month, and at present there is no single activity of the Bureau that is not related to the war. The majority of its projects are essential—and many of them vital—to eventual victory.

After Pearl Harbor, the engineers and technologists of the Bureau were instructed to intensify their activities, directed toward putting idle mineral resources to work. As we approach the anniversary of the nation's first full year in the war, we believe that the Bureau of Mines has reached many of these objectives and others are well on the road to attainment.

A brief summary reveals that the Bureau has developed metallurgical processes by means of which low-grade and complex domestic ores can be utilized, that it has more than doubled the output of helium, charted millions of tons of critical, essential, and strategic ores, developed or tested numerous methods and processes of beneficiating domestic ores, and launched extensive action to help the mineral industries to protect their plants from subversive action. The Bureau has worked closely with the Army, Navy, War Production Board, Reconstruction Finance Corporation, Metals Reserve Company, and other agencies on special projects; its economic and statistical data are used daily by these and other war agencies for planning strategic moves in the global conflict.

By virtue of the vast, and heretofore untouched, reserves of ores, coal and other materials in the western part of the United States, this section of the country naturally has received a great deal of attention in the Bureau's program. Especially has this been true in the exploration and utilization of the strategic minerals manganese, chromite, tungsten, and alumina-bearing materials, and in studies and research designed to assist in the expansion of the steel industry in the West. In my remarks to follow, I shall mention briefly some of the outstanding endeavors pursued by the Bureau of Mines in the West.

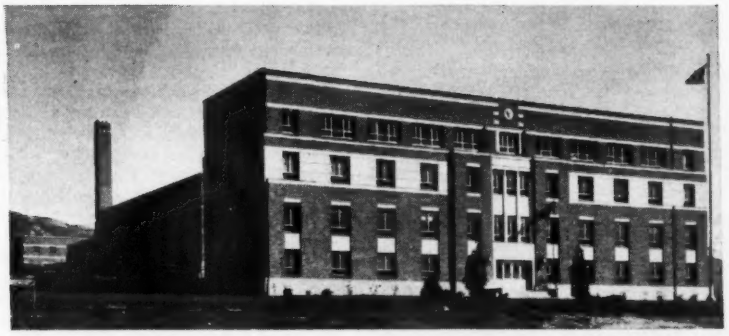
Under the Strategic Minerals Act of 1939, the Bureau was authorized to investigate domestic deposits of strategic minerals and a program of exploration was launched in August of that year. This program has been pursued diligently up to the present time and more than 1,600 deposits of war minerals have been studied by the mining and metallurgical staffs. Estimated reserves of commercial or near-commercial grade ores have been increased by more than 56 million tons as a result of this work. From 96 of the most promising deposits, a total of 56 have proven successful in that war production has started or can be started with the aid of small subsidies.

Heading the list of achievements in this field has been the addition of more than 30 million tons to the reserves of chromium, manganese, mercury, iron, tungsten, nickel, and aluminum ores during the past 12 months

--U. S. BUREAU OF MINES

Prospecting for tungsten in California

* Dr. Sayers was on the program of the Metal Mine War Conference to deliver this address but pressure of work prevented his appearance in Salt Lake City.



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The Bureau of Mines' Inter-Mountain Experiment Station, Salt Lake City, Utah

alone. A sizable portion of these reserves is in the West. War regulations prohibit the quoting of detailed figures, but I can call your attention to some of them.

Several hundred-thousand tons of tungsten ore found in Idaho constituted the largest and most important deposit of this ore ever discovered in the United States. In Montana, several million tons of strategic chromite ore were indicated through exploration. Idaho also was the site of important deposits of antimony and mercury ores, and manganese ores in substantial quantities were mapped in a number of the states. In addition, several million tons of iron ore were charted in the western states.

Some of the ores discovered or explored by the Bureau of Mines are high-grade and can be utilized through ordinary commercial processes, but others are low-grade or complex and therefore require special treatment before they can be utilized. Thus the second step in the war program is to improve known metallurgical processes and develop new ones to meet the expanding needs of the nation.

Property owners who desire examination of mineral deposits containing strategic, critical or essential minerals should write to the nearest district engineer of the Bureau of Mines giving full information on the deposits. This letter should contain data on the location and ownership of the property with detailed directions for reaching the deposit. Pertinent data such as a report on the property giving a general description of the mineral showings, sampling that has been done, and an assay map showing the places where samples have been taken, with corresponding assay results and tonnages of ore that have been shipped from the property also should be furnished.

Upon receipt of this information, a district engineer will consider the property for a preliminary examination by a Bureau engineer. Property will be visited and examined, samples will be taken and a preliminary report will be submitted by the engineer to the district engineer. If this preliminary report is favorable, the property will be recommended for a project to the regional engineer who in turn will submit a report to the Washington office recommending the property for a project and asking for allocation of funds for the work.

After the project has received approval in Washington, the regional engineer will be notified and a project engineer will then be assigned to begin the exploratory work that has been recommended. The exploratory work recommended may be trenching, test pitting, tunneling, or diamond drilling, or it may be a combination of all. Samples that are taken from the projects are sent to Bureau laboratories for analyses and in some cases large samples are taken for beneficiation tests.

After the work has been completed the results of the work accomplished will be assembled and issued as a War Minerals Report. A copy of the report is made available to property owners and to war agencies of the Government such as the War Production Board and the Metals Reserve Company.

District engineers in the Western States are at Salt Lake City, Utah; San Francisco, Calif.; Reno, Nev.; Portland, Oreg.; Spokane, Wash.; Helena, Mont.; Moscow, Idaho; Denver, Colo., and Tucson, Ariz.

The Bureau of Mines is conducting laboratory investigations and pilot plant tests on a large scale throughout the United States, and encouraging results have been obtained in many fields. Metallurgists and chemists are laboring to devise methods of recovering metals from the low-grade and complex ores. From their experiments we have found that enough manganese, chromium, magnesium, and aluminum can be obtained from domestic ores if it becomes necessary to make the United States self-sufficient. Processes have been developed for beneficiating ores of aluminum, antimony, cobalt, copper, iron, magnesium, mercury, nickel, tungsten, and zinc. The nonmetallics, including graphite, glass sand, talc, asbestos, and fluorspar, also have received attention in laboratories and pilot plants.

A considerable portion of the metallurgical problems were solved in the Bureau's experiment stations in the Western States. Some of these stations have been functioning for years, but others have been constructed or expanded recently to meet the growing demand for work of this nature in the West. They include among others, the Intermountain Experiment Station at Salt Lake City; the Electrometallurgy Station at Boulder City, Nev.; the Southwest Experiment Station at Tucson, Ariz.; the field laboratory at Pullman, Wash.; the Pacific Experiment Station at Berkeley, Calif., and the Rare and Precious Metals Experiment Station at Reno, Nev.

Despite the amount of work that

Research for the correct treatment of various types of manganese ores by flotation at the Salt Lake City ore-dressing laboratories

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Sawtooth bucket on "Kelly" bar, fishtail bucket and knife bucket lie in the foreground. Drilling a mercury deposit at Coso Springs, Calif.

the Bureau has done in the exploration of mineral deposits and development of metallurgical processes, an even greater expansion of this type of work is needed. The present emergency, finding us with a scarcity of many of the essential materials of war and peace, brings home the fact that the United States should delve further into the potentialities of its mineral resources. We should know the grade and quantity of every mineral to be found in this country in order to be prepared for any future emergency. We should know the location, quality, and accessibility of all of them, leaving nothing to surmise. This calls for an expansion of the minerals exploration program, and possibly the erection of more laboratories and pilot plants or the enlargement of existing facilities, as well as the employment of additional mining experts, chemists, and metallurgists.

To implement such an expansion in a material inventory of resources, the Bureau is aware of the need for more complete statistical coverage of the mineral industries. The demand for metals, fuels, and other materials in the defense and war programs has emphasized the importance of the work of the Economics and Statistics Service of the Bureau. This service collects and interprets statistical data on minerals, domestic and foreign, and disseminates these data to the mineral industries and agencies of the Government. Because virtually all minerals play an essential part in the war, the service has been from the start an indispensable part of the Government's organization for war.

Expansion of this phase of the Bureau's work began in September, 1939, when monthly surveys on the production, consumption and stocks of strategic minerals were undertaken. As the complexities of the supply problem increased with the mounting war activities, the work of the service was augmented. Today more basic facts are available on the mineral industry than ever before. Personnel of the economics and statistics service are devoting all of their time to compiling data and performing special surveys for the war agencies of the Government.

Specialists on Mineral Prices, Tariff and Taxes Needed

The present demand for minerals has created many problems and this terrific drain on mineral resources will create more problems, particularly in the Western States. A broader economic study is needed to meet the situation, and the Bureau can give additional constructive service in this field. With this in view, the Bureau needs additional specialists on transportation, prices, tariff, taxes, and costs of production of minerals. So far the Bureau has been occupied fully with tasks required by the production and planning agencies of the Government; it has had no time in which to make the broader economic studies that can be so useful to industry and are needed to guide post-war expansion of the mineral industries. In addition to such broad phases of work, the Government should be in a position to supply full and specific information regarding any mineral or mineral industry, including data from which conclusions can be drawn on where to build mills and plants, the expected return from an enterprise, and other pertinent facts.

Industrial expansion of the West, based upon the availability of low-cost electric power, is creating a demand for metallurgical coke. This arises from the need for an increase of iron-and-steel producing capacity, munitions plants, and other metallurgical industries. In response to the demand, the Bureau of Mines has made an investigation of coal mines in Washington, Wyoming, New Mexico, Utah, Colorado, Arkansas, Oklahoma, and Kansas, and has found coals that can be used for making coke. The technologic and economic ramifications of this study are great, and the coking properties of western coals are being investigated on a continuing basis so that any new industry can make the best use of the natural resources close at hand.

The known western coals which produce metallurgical coke suitable for iron blast furnaces are limited to the Lower Sunnyside bed in Utah, the coal from Pierce County, Washington, and certain beds in Southern Colorado and Northern New Mexico. The steel plants in Utah and California rely on the Sunnyside coal. Seeking additional sources of coking coal, the Bureau has investigated the coal in an area in Lincoln County, Wyoming. Coking tests made on coal from this area showed the coke to be almost equal in quality to the Sunnyside coke. Exploration of the area, which is adjacent to the railroad and within a reasonable distance of Utah steel plants, began on July 1, 1942. A small body of coking coal may exist in the White Oaks District of Lincoln County, New Mexico, but physical conditions surrounding the area and the distance from railroads present economic problems.

To aid the West further in obtaining suitable raw materials for the production of pig iron and steel, the Bureau of Mines has recently conducted explorations on seven deposits of iron ore and mapped several million tons of usable ore. Some of these explorations were in the Eagle Mountain District in Riverside County, California; the Bull Valley deposits of Washington County, Utah; Navajo County, Arizona; Columbia County, Oregon; Socorro County, New Mexico, and Lyon County, Nevada.

The industrial development of the United States has depended largely on the free and unlimited use of coal for heat and for mechanical and electrical energy. The Northwest will require a similar economical source of energy if it is to realize its fullest industrial expansion. High-grade coals like those of the eastern and central sections are not so common in the Northwest. Investigation by the Bureau and the University of North

Dakota has shown that subbituminous coal and lignite, which are abundant in this section, can be steam dried for as little as 30 cents a ton to yield fuel of relatively high heating value and suitable for use in large industrial boilers and small domestic heating plants.

Western coals also have figured prominently in the Bureau's experiments in the hydrogenation of coal to produce gasoline and oil. Since 1937 the Bureau has conducted research on this subject and operated a small experimental hydrogenation plant at Pittsburgh, Pa. A part of this work is the examination and testing of the different types of American coals to determine their suitability for use in the hydrogenation process, and a number of western coals have been found to be suitable for producing gasoline, lubricating oil, and other products. A recent publication of the Bureau contains analyses of oils produced by this method from western coals. The Bureau is preparing to investigate another process—the Fischer-Tropsch method—and western coals likewise will be examined as to their adaptability to liquefaction.

Two important wartime functions of the Bureau of Mines are to regulate the sale and distribution of nonmilitary explosives and their ingredients through a licensing and inspection system, and to make secure from interrupted operation the mines, smelters, quarries, and other mineral plants of the nation. The Explosives Control Division was organized shortly after the United States entered the war, and the Mineral Production Security Division now is also in operation.

At present licenses have been granted to more than 200,000 persons, authorizing them to manufacture, sell, buy, use, or otherwise handle explosives. There are 4,500 licensing agents—most of them local public officials—in all the states, and field investigations are conducted by 50 special investigators. In the program to protect mines and plants from subversive action, the Mineral Production Security Division has 76 field engineers in 48 states to inspect mineral facilities to assist the owners and operators of properties in protecting their establishments. Reports of the investigations prepared thus far have been submitted to the Office of Civilian Defense, the Federal Bureau of Investigation, the Provost Marshal General, and other war agencies that are cooperating with the Bureau of Mines in a nationwide program to combat sabotage.

Last June the operating structure of the Bureau was modified to meet emergency conditions and to provide an organization for accomplishing its war aims more readily. Greater emphasis was placed upon exploratory work, the development of metallurgical processes, and the utilization of these methods on a wider scale to bring hitherto unused deposits of ore into production.

The Bureau of Mines decentralized some of its operations. Three regional engineers were appointed and assigned to three geographical regions of the United States—an Eastern Region, a Central Region, and a Western Region. These regional engineers are directly responsible for the operation of laboratories and pilot plants and for other field work dealing with the mining and beneficiation of minerals in their respective regions. Under their supervision district engineers have been established in the several states (generally one engineer to a state) to correlate the work of the Bureau in those states and to establish closer contact with the persons in the mineral industries actually engaged in mining, smelting and refining operations and potential producers of metals and minerals for the war, as well as with State agencies engaged in geological and mining work. One of the primary purposes of this organization is to enable the Bureau to ascertain more readily the needs of the mining communities and to become familiar with their problems and to assist in the solving of them.

This organization has been in operation only a few months and it is, therefore, too early to tell how effective it will be in helping the mining industry to increase production of the minerals needed for the war. The objective of this program is to help you in the mining industry. We are anxious to know whether this assistance is operating effectively and whether you think it will be of benefit in the future development of the mining industry. We are eager to have your suggestions and advice as to how the Bureau of Mines can serve you best, for that is its objective. The Bureau appreciates sincerely the excellent cooperation it has received from the mineral industries and I hope that our pleasant relations will continue through the years.

Small scale "cracking" plant. The medium oil obtained in the first stage of coal liquefaction is transported to this still and is "fractioned" or distilled to produce more gasoline, diesel oil and other products

Electric Power Distribution For Open-Pit Mines and Quarries

Part I—A timely review of important data that contributes to efficient electrical maintenance and planning of power requirements for shovels, draglines and other open pit mine equipment

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THE IMPORTANCE of adequate design and construction of the a-c power distribution system in an open-pit mine or quarry, and its effect on the safety, economy and continuity of operation of shovels, draglines, drills and other mining equipment cannot be overlooked, if the best performance of such equipment is to be secured. A review of the principal factors entering into this problem, therefore, may be of assistance in planning new mine layouts, or indicating improvements that might be desirable in existing installations.

As the power distribution system is largely determined by the requirements of shovels and draglines, these will be considered first. The term *shovel* will be used hereinafter to mean either shovel or dragline, since these machines are driven by the same form of apparatus, with power demands very similar in character.

Excepting in the smallest sizes, electric shovels use variable-voltage drive, with a separate d-c generator for each of the three main motions-hoist, swing and crowd. Each generator is designed to have a drooping volt-ampere characteristic, similar to that shown in Figure 1, which automatically limits the peak kilowatt output to a fairly definite value. Thus, in normal operating condition, the shovel equipment is inherently load-limiting, and the maximum demands on the power supply system by the main a-c motor which drives the shovel generators can be closely predicted.

Transformer Substations

In the usual case the mine receives power at high voltage and one or more transformer substations are installed to step down to a voltage suitable for distribution and use on motors.

Distribution Voltages:

The voltage best adapted to the distribution of power in a given mine will depend upon such factors as:

Ratings of motors to be supplied.
Disposition of power loadings in mine.
Suitable locations of substations and corresponding distribution distances.
Form of construction of distribution lines.

The smallest electric shovels, particularly those using friction clutches and single-motor drive, with ratings up to 125 hp. frequently use 440-volt motors. At this voltage, however, power can be transmitted only very short distances, with acceptable voltage drop and power loss at peak demands. Little or no overhead line from the transformers will be permissible, and oversize conductors may be necessary in cables 1,000 feet or longer, even if no overhead line is used.

Variable voltage shovels in the mining and quarry class, including coal loading shovels with main a-c motor ratings from 125 hp. to 350 hp., ordinarily use 2200-volt or 3810-volt motors. The higher voltage will often prove preferable for all sizes, if the distribution circuits are to be extensive.

Stripping shovels, having main a-c motors of 600 hp. and larger ratings, are generally powered at 3810 volts or slightly higher voltage.

Standard voltage ratings of transformers for supply of such distribution systems are approximately 10 percent above the motor voltages noted in the foregoing.

Transformer Ratings:

As shown by Figures 2 and 3, individual shovels present extremely variable loads. During each operating cycle, which may be as short as 15 seconds duration for a small loading shovel, up to 50 or 60 seconds for a large stripping machine, the power demand may exceed the full load rating of the main a-c motor for 30 percent or more of the time, and in each cycle there may be momentary peaks of the order of 200 percent or more of full load input to the motor.

In steady digging, the r.m.s. loading of the main a-c induction motor may approach its continuous rating. Where a single shovel is supplied from the mine substation, the r.m.s. current loading of the transformers is the same as that of the a-c motor on the shovel, and as the a-c induction motors used in this service are of high efficiency and power factor, generally averaging better than 90 percent at full load, the minimum rating of the transformer required for supply of one shovel is found as follows.

Allowing for an r.m.s. loading of the transformer equal to full load current input to the main a-c driving motor, and for a ratio of 2400/2200 or 1.09 between standard transformer and motor voltage ratings, the continuous kva. rating determined by the formula No. 1 shown below will be conservative for transformers supplying a single shovel.

That is, for supply of a single shovel a continuous rating of 1 kva. in transformers for each horsepower in the main a-c induction motor rating will be adequate.

Where a number of shovels are operated from the same substation, since the shovel operating cycles and their peak loads will not all coincide, the ratio of peak to average demand on the transformers is less than on the individual shovel feeders. The more numerous the shovels in operation, the more nearly uniform becomes their combined demand, and the nearer the transformer loading approaches the sum of the average power demands of the individual shovels. The average demand of the shovel in steady digging will ordinarily be within 70 percent of full load input to the main a-c induction motor. For a large number of shovels the continuous rating of the transformers required is given by formula No. 2 shown below.

No. 1

$$1.09 \times \frac{(\text{hp. Rating of a-c Motor}) \times 0.746 \text{ kw. per hp.}}{0.9 \text{ Eff.} \times 0.9 \text{ P. F.}} = 1 \text{ kva. per hp.}$$

No. 2

$$1.09 \times \frac{0.7 \times (\text{hp. Rating of a-c Motor}) \times 0.746 \text{ kw. per hp.}}{0.9 \text{ Eff.} \times 0.9 \text{ P. F.}} = 0.7 \text{ kva. per hp.}$$

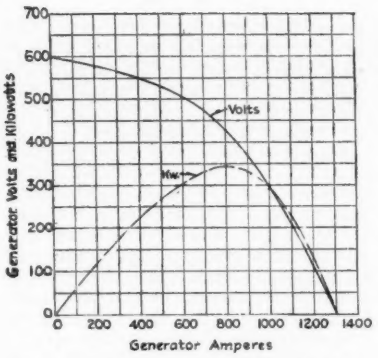


Fig. 1. Volt-ampere and kilowatt characteristics of variable-voltage shovel generator

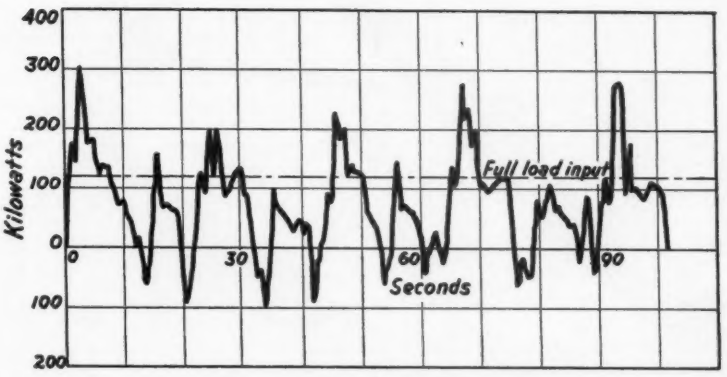


Fig. 2. Power input to 2½ cu. yd. shovel loading iron ore

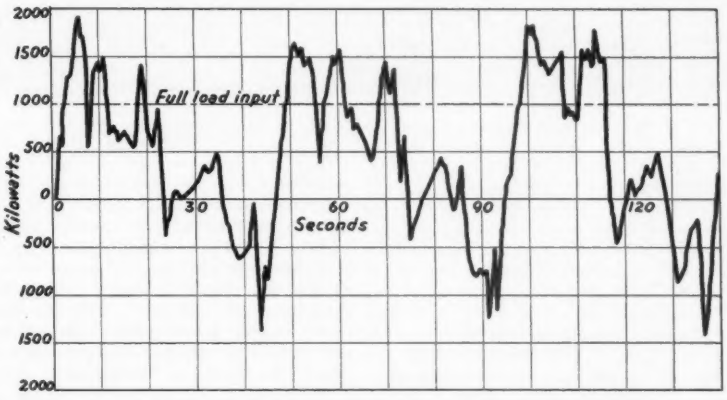


Fig. 3. Power input to 35 cu. yd. stripping shovel

That is, for supply of a number of shovels, a continuous rating of the order of 0.7 kva. in the transformers for each 1 hp. in the sum of the main a-c motor ratings will be adequate.

For any number of shovels the required transformer rating may be approximated from a curve, such as that shown in Figure 4. In every case, of course, additions should be made for drills, pumps, compressors, or other auxiliary equipment supplied from the same substation, and transformers of the nearest larger standard rating applied.

The transformer rating for a number of shovels, indicated by this curve, will probably be somewhat conservative, as the currents to different shovels are at various power factors and add vectorially in the combined load. The average value of the combined currents, therefore, will be less than the sum of the average current inputs to the several shovels. In many cases, also, allowance may be made for delays in operation of individual shovels.

It should be noted that the method of estimating transformer rating described in the foregoing is for shovels using induction motors driving the main motor-generator sets, or in the case of a small equipment, the shovel itself. The main m-g sets of large shovels, in the stripping class, are nearly always driven by synchronous motors, designed for operation at 0.9 or 0.8 leading power factor at full load. The current input to such motors at no-load is of the order of 70 to 80 percent of the full load current, as compared with 30 percent or less for induction motors of the designs used to drive shovel sets. As a result of this characteristic, the average current input to a synchronous motor driving the m-g set of a shovel in steady digging may be as high as 85 percent or more of the full load motor current. That is, the ratio of average current to r.m.s. current on the shovel operating cycle will be considerably greater with synchronous motor than with induction motor drive for the main m-g set. Conversely, the variation of power factor over the operating load range is considerably greater with the synchronous motor than with the induction motor. As current to the separate shovels at different power factors add vectorially, the combined load will be smaller in comparison with the sum of the average loads of the different shovels with synchronous motors than will be the case with induction motors. A curve such as that shown in Figure 4, therefore, should give an approximate guide to the transformer rating required to supply a number of shovels equipped with synchronous motor-generator sets, excepting that the rating should be a little higher than indicated for induction motors.

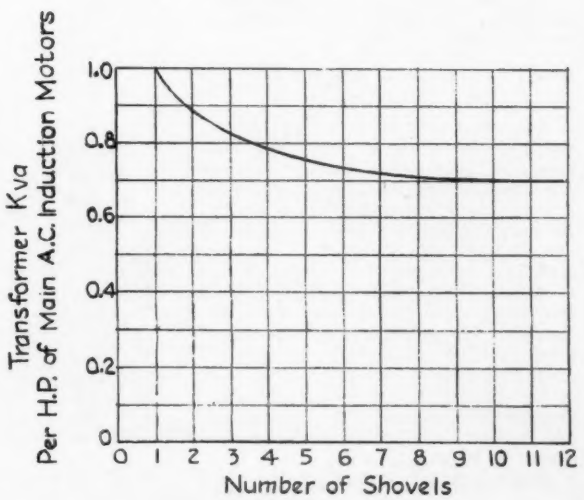


Fig. 4. Transformer rating required for power supply to electric shovels

A 16-cu. yard stripping shovel. The cable is shown in the foreground

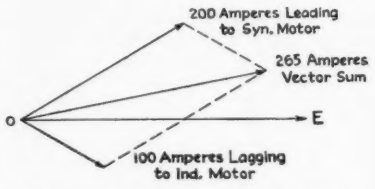


Fig. 5. Vector sum of leading and lagging AC motor curents

Where shovels using synchronous motor-generator sets are operated on the same circuits with other shovels using induction sets, or where there is any other considerable induction motor load, the transformer loading will be less than the sum of the synchronous and induction loads, since the vector sum of the synchronous motor currents at leading power factor and the induction motor currents at lagging power factor is less than the algebraic sum. This is illustrated in Figure 5.

Shovel Performance Affected by A-C Voltage Regulation:

The effect of drop in voltage delivered to the main a-c motor on the speed and production of a shovel, and the necessity of holding as near as practicable to the rated voltage of the motor, to obtain the best shovel performance, is not always fully appreciated.

Mention has been made of the drooping voltampere characteristics of the d-c variable voltage shovel generator, which inherently limits the maximum output and power demand of the generator. These characteristics, at full generator field excitation, and normal speed, have the form shown in Figure 1.

With the maximum demand of each generator fixed by its design and field adjustments, the peak demand of the three shovel generators can be fairly closely estimated. One of the main requirements of the a-c motor which drives the m-g set, then, is that its maximum or pullout torque be adequate to carry the peak loads of the generators in the heaviest service for which the shovel is designed.

The pullout torque of an induction motor varies as the square of the square of the voltage applied to its terminals, and that of a synchronous motor directly with the voltage. Allowing for a reasonable variation in supply voltage, the a-c motor must be designed so that its pullout torque at the minimum a-c voltage expected will be sufficient to carry the peak loads of the shovel generators.

It is generally practicable to design the power supply and distribution system for an open-pit mine so that at maximum demand on the system the voltage received by the a-c motors does not fall below 90 percent of rated motor voltage and at minimum demand the voltage does not exceed 110 percent. The a-c motors of shovel equipments will, at 90 percent of rated voltage, develop sufficient pullout torque to carry the required peak loads, and will operate safely at 110 percent of rated motor voltage. Accordingly, for a 2,200-volt motor, the range of voltage received at the shovel should be no greater than from approximately 2,000 volts minimum to 2,400 volts maximum; for motors of other rated voltages, the maximum variation should be in the same proportion.

Sacrifice of Shovel Performance Does Occur

Although a shovel may be expected to operate successfully if the range of voltage variation does not exceed 20 percent of the rated voltage of the a-c motor, and there are many mines in which greater variation exists, without any apparent operating difficulties, such practice encroaches on the margins of safety and performance provided in the electrical equipment. Although not readily apparent, if the a-c motor voltage is allowed to fall too low, there is a sacrifice of shovel performance, particularly where the shovel m-g set is driven by an induction motor.

The speed-torque curve of the induction motor at rated voltage and frequency is of the general form shown in Figure 6. The motors driving shovel m-g sets, supplied with 60-cycle power, are almost always 4-pole designs, with no-load speed of 1,800 r.p.m. The full-load speed is from 1 to 2 percent less, and the drop in speed from no-load to full load is nearly uni-

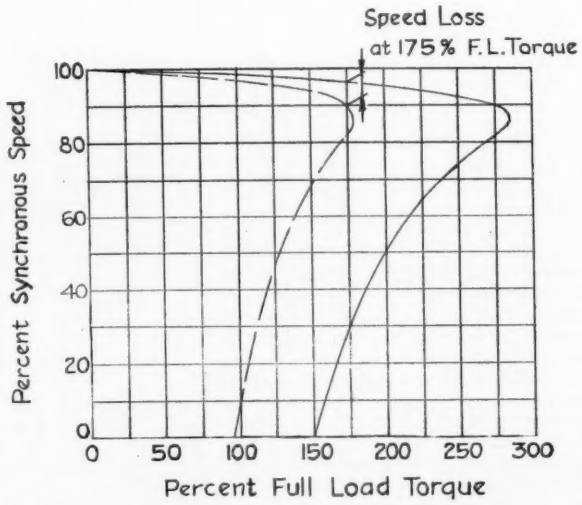


Fig. 6. Typical induction motor speed-torque curves

form, or in other words, on a straight line. At high overloads, approaching the pullout torque, the speed drop is at somewhat greater rates, and motors of the designs used in shovel equipments reach their maximum or pullout torques at approximately 90 percent of the no-load speed.

With reduction of voltage applied to the a-c motor the maximum torque is lowered, and the speed-torque curve takes a form such as that shown by the broken line in Figure 6. At peak loads of the order of 200 percent or more of the motor rating, which are normal requirements in shovel service, this shows a considerable loss in speed, as compared with the full voltage curve. The shovel generator voltages are thereby reduced, both by the loss

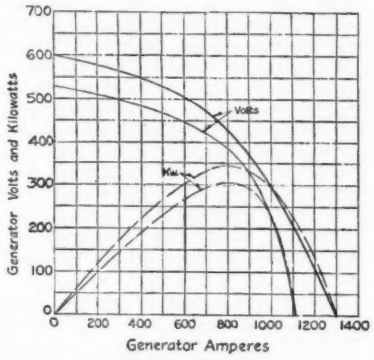


Fig. 7. Showing effect of a-c motor speed drop on voltage and power of d-c shovel generator

in speed and, where the exciter is driven as a part of the main m-g set, as in most modern shovel equipments, also by the reduction in exciter voltage. The result is reduction in speeds of all shovel motions. In addition, the generator maximum currents are lowered almost in direct proportion with the exciter voltage, and the d-c motor fields are weakened, lowering the stalling torques of the shovel drives.

The net result is that the generator volt-ampere and power curves are lowered by reduction in a-c voltage, as indicated in Figure 7; the electrical equipment "loses power," and the shovel tends to become sluggish in operation. This may not be appreciable if the voltage does not fall below 90 percent of rated a-c motor voltage but it is apparent that the shovel performance will be affected more or less by any drop in a-c supply voltage. Where feasible, in most cases, it will prove advantageous to design the power distribution system to hold the voltage at all times above 90 percent of rated value, particularly where any of the main m-g sets of shovels are driven by induction motors.

A synchronous motor operates at constant speed, fixed by the number of poles for which the motor is wound and the frequency of the power supply. Its speed is not affected by variations in voltage, as long as the torque demand does not exceed its maximum or pullout torque. If this torque is exceeded the rotor pulls out of synchronism, drops in speed, and heavy currents are drawn which will overheat the windings, if the motor is not disconnected from the line or resynchronized in a very short time. Synchronous motors driving shovel m-g sets are ordinarily designed to develop the required pullout torque at 90 percent of rated voltage, and power distribution systems for mines using such motors should be designed to hold the voltage above this value at all times. Otherwise a sacrifice in the power available in the shovel equipment, and a loss in shovel performance may be necessary.

The drop in voltage at any point in a-c power distribution system is made up of the resistance and reactance drops in all component parts of the system, up to that point, caused by the currents flowing in these parts. There may be a voltage drop in the primary system from which power is taken, also, but where the capacity of this system is large in comparison with the mine power demand, as is usually the case, this voltage drop will be negligible. However, any periodic variations which occur in the incoming voltage supply to the mine must be taken into account in the design of the distribution system, as the voltages in the mine will vary in direct proportion.

The resistance and reactance of each part of the circuit are determined by its length and by the wire size and spacing. The various resistance and reactance voltage drops subtract vectorially from the incoming supply voltage (divided by the transformer ratio), and their effect on the voltage is influenced by the phase angle of the current, or in other words, by the power factor.

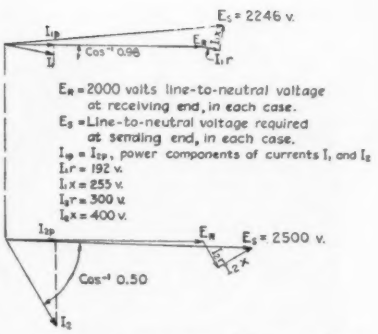
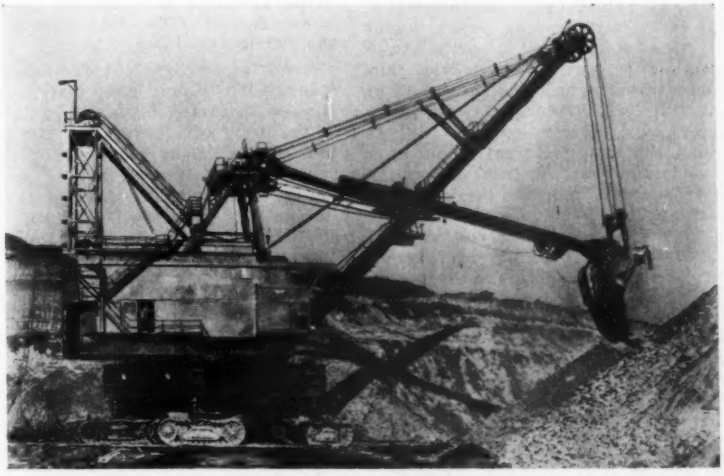


Fig. 8. Showing effect of power factor on voltage drop in distribution system assuming equal values of power transmitted

For any given quantity of power transmitted, of course, an improvement of power factor reduces the amount of current, as well as the phase angle, and lowers the voltage drop. At higher power factor the vector subtraction of the reactive voltage drop will lower the voltage at the receiving end by a smaller amount, as shown by Figure 8. With any considerable amount of reactance in the distribution system, therefore, as will be the case with transformers or overhead lines, the use of synchronous motors or other apparatus taking current at high or leading power factor, in sufficient amount to offset the lagging currents of inductive apparatus, and raise materially the power factor of the combined load, may greatly assist in maintaining proper voltages at the shovels and other mining equipment. Incidentally, it should be noted also that as improvement of power factor lowers the current in the system, the kva. loading of transformers or the power source is lowered, so that the use of power factor corrective apparatus may per-



A 30-cu.yd. stripping shovel. The shovel cable can be seen from the top of the high wall into the pit

Coal loading shovel. The large stripping shovel in the background is removing overburden

mit greater power loads to be carried by transformers or generators already installed.

Where conditions do not favor the installation of synchronous apparatus, capacitors may be used for power factor correction and improvement of voltage regulation in the mine distribution system. For maximum benefit they should be located as far as practicable toward the load.

Exact rules cannot be given here for the selection of the rating and the most beneficial location of power factor corrective apparatus. These can be determined only by a study of each system as an individual problem, taking into account the constants of the different parts of the system and the character and distribution of loads expected.

It should be noted, in this connection, that synchronous motors designed for 90 percent leading power factor at rated load, as used in shovel equipments, when operating at no-load, take currents of the order of 70 percent of the full-load current, at very nearly zero power factor leading. Where such a motor (or motors) makes up a considerable part of the load on the distribution system, the large leading currents drawn at no load will cause a rise in voltage in the reactance in the distribution circuits and transformers, and the voltage impressed on the motor, as well as on any other apparatus connected to the lines, will be in excess of the no-load voltage of the transformers, and may reach an unsafe value. This effect is illustrated by the vector diagram in Figure 9.

As the no-load current input to the synchronous motor is lowered with reduction in field strength, automatic control of the field, to limit the variation in current input and the consequent voltage changes has been considered. It is doubtful if worth while improvement can be obtained in this manner, however, as the changes in motor load during the normal shovel operating cycle are so wide and so rapid as to permit little change in field strength.

Where synchronous motors are to be used, the distribution circuits should be designed to have the lowest practicable reactance, to limit the voltage rise at light loads.

Transformer Regulation:

Due consideration is not always given to the fact that a considerable part of the voltage drop in a power distribution system may occur in the transformers feeding the system. Transformer windings have resistance and reactance, and voltage drop in these windings is influenced by the power factor of the load, just as in the distribution lines.

Transformers of the types and ratings used to supply mine distribution circuits generally have a regulation of the order of 1 percent at 100 percent power factor and from 4 to 5 percent at 80 percent lagging power factor. The regulation of a transformer may be defined as the difference between the no-load and the full-load secondary voltages, at a specified power factor, for the same primary voltage, expressed as a percentage of the full-load secondary voltage. In other words, the regulation is a measure of the voltage drop in the transformer windings.

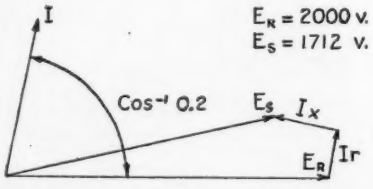


Fig. 9. Showing voltage rise in reactance of distribution system with leading current

Where the mine load is composed largely of inductive apparatus, such as induction motors on shovels, drills, and other auxiliary equipment, with heavy peak power demands at low lagging power factor, the voltage drop in the transformers cannot be neglected. Its effect on the overall voltage regulation of the system is reduced, however, if corrective apparatus is applied to raise the power factor of the peak load on the transformers.

In some cases it may prove economical to apply transformers of special low-impedance design to reduce the regulation and assist in maintainance of better voltage supply to shovels and other mining equipment during peak load periods, without exceeding at light load, a voltage that the motors can safely withstand. The use of Hipersil transformers, having lower voltage regulation than transformers of older design and construction, may prove of considerable benefit.

Where a number of shovels and other mining equipment are supplied from the same transformers, so that in normal operation the variation in loading of the transformers is not great, their voltage regulation should still be taken into account, as the loading may be reduced to a very low value, with consequent rise in voltage, during idle shifts or periods of curtailed production. For such conditions where the transformer no-load voltage exceeds 110 percent of rated motor voltage, the use of tap-changing equipment on the transformers may be warranted, to lower the light load voltage to a safe value when only a few motors are in service.

Distribution System Layout

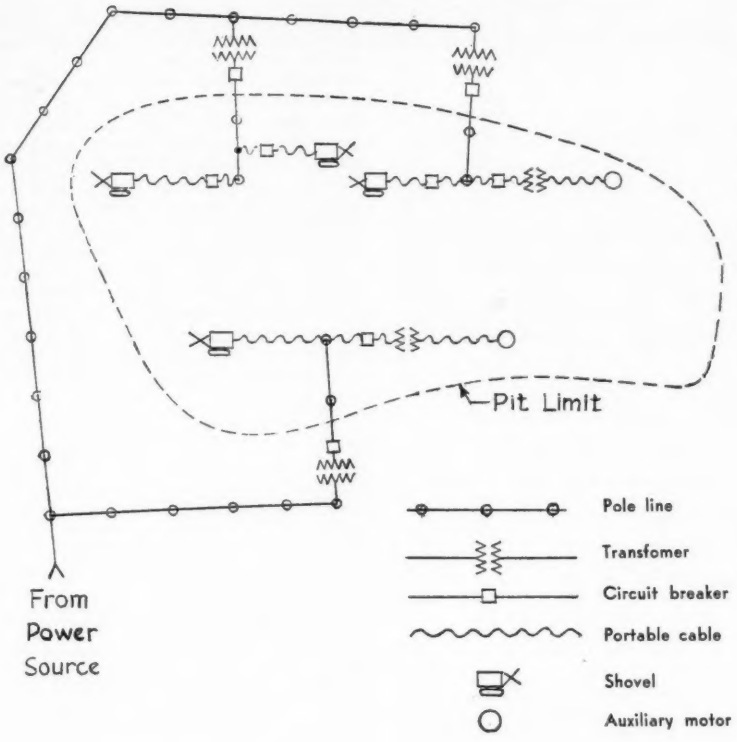
Substation Size:

Selection of a site for the transformer substation is generally made as a compromise among various more or less conflicting factors. Some of the main considerations are:

- Location of the incoming high-voltage lines.
- Permanence of the site.
- Shelter from blasting areas.
- Accessibility for construction, inspection and maintenance.
- Situation with respect to the average center of load, during the life of the mine.

In determining the best substation site, by comparison of such factors, small differences of cost or performance will be outweighed by the importance of ready accessibility, to

Fig. 10. Typical layout of distribution system for open pit metal mine



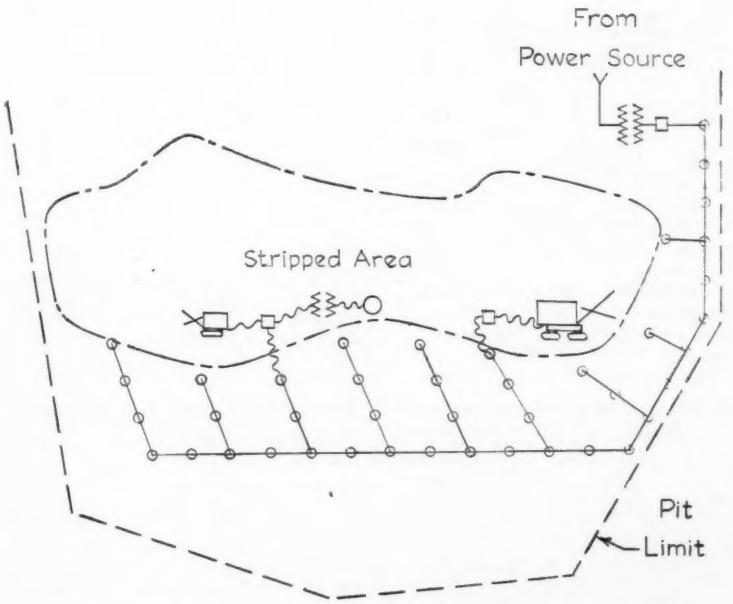


Fig. 11. Typical layout of distribution system for strip coal mine, using lateral pole lines

avoid unnecessary delays in restoring service after interruptions at the substation.

At a mine of extensive area, using numerous shovels and other equipment, several substations each feeding separate circuits to different sections of the mine may prove advantageous, as in this way material reductions can be made in the lengths of secondary distribution lines and the currents they are required to carry.

Various forms of construction are used in the distribution circuits from the secondary of the transformer substation into the mine. Some of the usual arrangements are shown schematically in Figures 10, 11 and 12.

At a metal mine or quarry in which the boundary of the mining area does not change over long periods of time, the high-voltage power lines are often carried to points near the edge of the pit, and from these points more or less permanent pole lines carried into the mine. Flexible cables tap into these lines at convenient points, connecting to portable switchhouses protecting the individual shovel feeder cables, or to small portable transformer substations, supplying low voltage circuits to drills and other equipment. Such layouts are similar to that shown in Figure 10.

In some cases, where electric haulage circuits are present, the a-c power distribution lines are carried on the same poles or towers with the trolley wires. Temporary circuits are sometimes provided by long flexible cables connected to the pole line outside the pit limits and laid across the mining benches.

Incoming power lines at moderately high voltage are sometimes carried into the mining area, and portable transformer substations used to step down the voltage for individual shovel feeder cables.

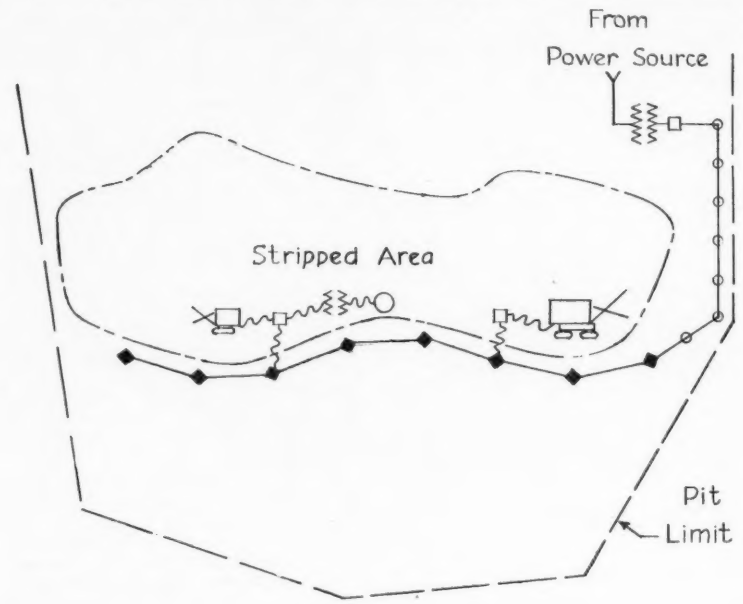
Strip Coal Mines Have Their Problems

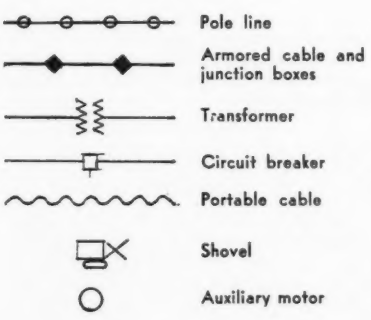
At strip coal mines, in which large areas are mined out in relatively short time, to avoid too frequent movement of pole lines, they must be placed some distance away from the area opened. To provide for connections to the overhead line at fairly close intervals and at the same time have the main pole line in a permanent location, a system of laterals to the workings may be used, as shown schematically in Figure 11. The lateral pole lines on the unstripped area may be carried to points near the high-wall and flexible cables from the ends of the lines laid in to the mine, to portable switchhouses.

With this arrangement the lengths of portable cables (including the high-wall cable) to shovels and other equipment in the mine need be long enough only to reach the end of the nearest lateral, and as the high-wall advances into the unstripped area, the lateral pole-lines are shortened, leaving the main pole-line undistributed.

In some cases, it is preferred to install well-guyed poles carrying long spans in the lateral pole-lines and to use several sections of portable cable, with a total length approximately the same as that of the span, from the end of the overhead lateral to a junc-

Fig. 12. Typical layout of distribution system for strip coal mine, using armored cable





tion box on the high-wall, to which the high-wall cable connects. This permits the laterals to be shortened in several steps, by removing sections of the lateral cables, before the end spans have to be taken down.

Three-Way Junction Boxes Used to Carry Current

At other strip coal mines, steel-armored main cable is laid above the high-wall, a short distance from the edge of the pit, with cable lengths of about 1,000 ft. connected together. Three-way junction boxes are used at points from which circuits are to be carried into the mine by flexible cables. With this arrangement, shown schematically in Figure 12, the armored main cable and junction boxes may be skidded back from the edge of the pit as required with advance of the high-wall.

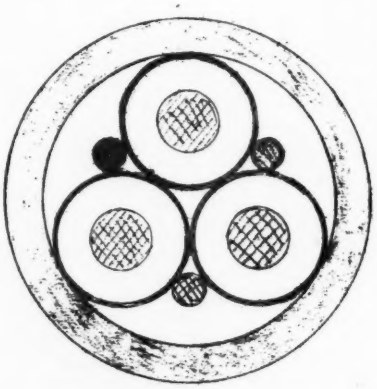


Fig. 13. Typical cross section of portable shovel cable with ground wires and sheaths

Design of Shovel Cables

Although there is some variety of detail construction in the flexible cables carrying power at 2,200 volts or higher voltage to shovels or portable auxiliary transformer stations, the basic construction consists of three rubber insulated power wires, with a wrapped or braided sheath of tinned copper wires around the insulation of each power wire, and with ground wires laid in the valleys between the triangularly spaced power wires. A heavy, reinforced outer jacket of rubber compound provides resistance to abrasion. In some cases, a woven copper sheath is used under the outer jacket. A typical cross section of such a cable is shown in Figure 13.

The purpose of the sheaths over the insulation of the power conductors is to reduce voltage stresses on the insulation and the effect of corona, and also to give some protection to men handling the cable, if there should be a failure or weakness of the insulation. The ground wires, in contact with the sheaths, have a total cross-sectional area near or equal to that of each of the power wires. The system of ground protection in which the cable ground wires are used, is described in a following section.

Cables of this description are used with power wire sizes ranging from No. 8, for 4,160 volt supply to the smallest electric shovels, up to No. 2/0 for the largest stripping shovels. Lengths ordinarily used are from about 500 ft. up to 2,000 ft. or more.

Approximate characteristics of shovel cables are listed in the summary below.

Part II of Mr. Borland's article will appear in the March issue of MINING CONGRESS JOURNAL.

60-CYCLE CHARACTERISTICS OF THREE-CONDUCTOR PORTABLE CABLES

Wire Size A. W. G.	Current Carrying Capacity Amperes *	Resistance Ohms Per Mile at 65° C.	Series Reactance Ohms Per Mile
8	35	4.0	0.272
6	50	2.5	0.253
4	65	1.6	0.234
3	75	1.25	0.229
2	90	1.0	0.222
1	100	0.79	0.214
0	120	0.62	0.206
00	135	0.5	0.200
000	155	0.39	0.195

* For ambient temperatures of 40° C. and copper temperatures of 60° C. with cables in air. Correction factors should be applied to the specified current capacities when cables are wound on reels.

The Coal Division Committee on Safety

By L. C. CAMPBELL, Chairman

A Resume of the Proceedings of the Meeting on December 1 Which Formulated Plans and Procedure for Carrying On the Committee Work

In presenting this announcement, the Safety Committee specifically points out that it is not their intention to attempt the enforcement of any practices which their reports may recommend. The plan of the committee is to make studies on the results of safety methods being used or proposed, and to present to the industry the conclusions drawn from these studies, in the hope that individual companies may find therein information that will be helpful in reducing accidents at their mines.

EVERAL MONTHS AGO it was announced that a Safety Committee was being organized by the Coal Division of the American Mining Congress, but before definite plans were formulated it was deemed advisable to get the views and opinions of a number of men in the coal industry as to what the purpose and scope of this committee should be and what results could be accomplished. Sectional meetings were accordingly held in Pittsburgh, Charleston and Chicago; these were attended by a total of about fifty men—operators and representatives of Federal and State mine inspection departments — who expressed the unanimous opinion that an active Safety Committee, representing all branches of the coal industry, could exert a decidedly beneficial influence in reducing accidents in mining.

It was therefore agreed to proceed with the committee plans and an organization meeting was held in Pittsburgh on December 1, in conjunction with the Annual Conference of the Coal Division. The agenda prepared for discussion was based on the proceedings of the preliminary meetings, where four general lines of endeavor were recommended. These were considered and developed as summarized below:

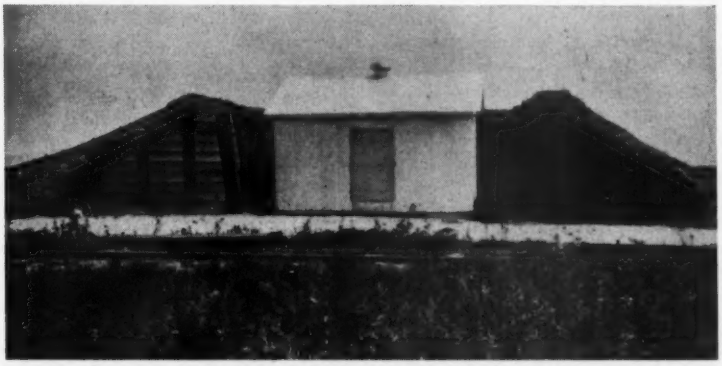
1. *The committee should outline approaches to various problems of accident prevention and clarify safety ideas — gathering material from all available sources and disseminating it to the industry.*

The committee, being composed of operators from various districts, as well as Federal and State representatives, has access to a great amount of valuable safety material, originating through company records, and further material can be obtained through contacts with associations and institutes in the different fields. Acting as a clearing house, the Safety Committee could extract and compile such material into concise reports on subjects of common interest and as time goes on, this would create a reservoir of practicable safety ideas from which definitely engineered recommendations could be formulated. This particular activity would be carried on by the entire committee—each member submitting material as it became available through his own company or other sources, and it was the thought that there would be a sufficient volume of such reports to constitute a running account for circulation to the industry.

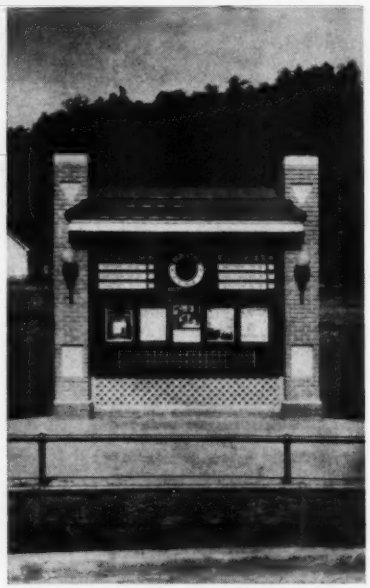
2. *Uniformity of safety procedure, wherever possible, is recognized as desirable but some conditions require individual methods of correction. The committee should define safety practices for meeting special hazards and should promote the standardization of such practices as are applicable and beneficial to all mines.*

It is of course true that a uniform set of rules or specifications to prevent accidents could not be applied successfully in every coal mine, but there are perhaps a greater number of safety measures that can be reduced to a common denominator than is realized. For example, methane is the same wherever it occurs and the results from igniting it are the same. Ventilation follows known laws of physics and the application of these laws has a similar effect on the air currents in every underground circuit. Haulage wrecks are apt to be classed as unavoidable, yet many derailments are due primarily to incorrect methods of track construction or maintenance. Shaft hoisting equipment has already been standardized and correct specifications are enforced to the point where accidents from rope breaks have practically disappeared. Machines for cutting, drilling and loading, as well as most electrical equipment, are manufactured according to standard patterns, and it therefore follows that many standard practices are applicable for their operation.

3. *The Coal Division of the American Mining Congress, through the various operating committees, should be enlisted to assist the Safety Committee by submitting technical*



Artificial barricades around a powder magazine



Safety bulletin boards always have a message

and factual reports on various phases of mining and general types of equipment.

Reports have already been completed and other studies are now being made by the Committees on Power, Roof Support and Ventilation, which have a direct relation to safety. The Power Committee has published several reports on safe carrying capacities for trolleys, feeders and returns, calculated expressly for mining service, and has also recommended methods for a conveyor wiring system with adequate protective devices. Roof strata is considered to be perhaps the most variable factor in a coal mine, but the Committee on Roof Support is planning to develop recommendations for preventing roof falls which will be based on laboratory determinations of the chemical composition and physical structure of the roof rock. The Ventilation Committee is starting a study on coal dust removal from mine air. All committees are ready to assist in the safety program by making reports and furnishing data on special or technical subjects as may be requested.

4. *The Safety Committee should establish a close cooperation with Federal and State inspection departments, with a view toward assisting and being assisted by these agencies.*

The Federal and State mining departments are organized for the purpose of preventing accidents, and, since the operators have this same object in mind, there is every reason for cooperation between these groups. Factual safety data is being developed by governmental laboratories and experimental stations, also by manufacturers in their shops and by coal companies in the mines, but whatever the source, the results of such research should be adopted where it proves beneficial. Statistics can be a valuable aid in determining where certain hazards exist, and records compiled by various agencies over a long period of years could be analyzed by the committee. The experiences of coal companies in following certain practices should be studied for an appraisal of the value of such practices. Some questions of course are controversial and their answer is a matter of individual judgment, but no man is infallible, whether he be employed by a company or the state, and differences of opinion can be ironed out by a mutual desire for agreement.

After discussing the general scope and procedure as outlined above, the committee selected five subjects for the first studies and reports: (1) Haulage Accidents; (2) Rock Dusting; (3) Safety Education; (4) Standard Safety Rules, and (5) Coal Mine Explosions. Each one of these was given thorough consideration as summarized below.

Coal Mine Haulage

It was pointed out that there was at present no uniformity between states and companies regarding safety regulations for haulage, and it seemed to be the opinion that there was quite an opportunity here to formulate certain recommendations that would be applicable in all mines, such as specifications for walkway clearances, shelter holes, trolley wire guarding, power line protection, etc.

In discussing this subject it was further brought out that while roof falls cause the highest number of fatalities and injuries in coal mining, there is actually a greater hazard in the haulage operations. The number of haulage injuries is less than those resulting from roof falls, but fewer men are employed in underground transportation than at the faces; therefore, on the basis of exposure, the accident frequency rate in haulage is higher than in the face operations. It was recommended that a study of the sources of haulage hazards be made for the purpose of indicating where corrective measures can be applied.

Rock Dusting

The effectiveness of rock dusting in preventing propagation of coal dust explosions has been proven by many examples and occurrences extending over a number of years, and as long ago as 1925 a set of standard rules was made, covering rock dusting in all phases of material and methods of application. Much has been learned since 1925 and several attempts have been made to revise the early specifications, but these have never been carried to completion. The committee proposes to study this subject with a view toward recommending what is now considered to be best practice.

Safety Education

This is a somewhat abstract subject but it was felt that much could be done toward reaching the individual after standards of safety have been set up. The experience of the railroads in reducing injuries to employes and passengers was cited as an example of the effect of formulating proper rules combined with positive adherence to these rules. Similar procedure of enforcement would in time establish habits of safety in coal mining and, as a result, safe methods of working would become automatic.

Numerous ways are now being used by companies and by federal and state agencies to inculcate safety habits among employes, including posters, bulletins, first-aid meets, talks and meetings, awards, safety competition between mines of the same com-

Mine rescue team, Inland Steel Co., Wheelwright, Ky.

pany and sections of the same mine, disciplinary measures and individual appeals to employes by company officials. All of these have some beneficial effect and a review by a subcommittee of the experiences of different companies could perhaps indicate a further enlargement and specific details on how these various methods of approach can be made to give more direct and tangible results.

Safety Rules

Every company has its own set of safety rules—these run from a single page up to volume size and vary from broad general specifications to details covering every operation. The thought of the committee is to formulate a simple code of safe conduct; the responsibility of management to provide safe conditions is recognized, but the human element enters into every accident and no matter what safeguards may be installed they will never be effective unless properly used and observed. For example, the block system on railroads, which is mechanically perfect, will not prevent accidents if the train crews fail to obey the signals.

Several years ago a Mining Congress committee inaugurated a study of safety rules, and after reviewing the booklets used by a number of companies, extracted and compiled a tentative set of recommendations, which could be the ground work for the new report. This former study found little disagreement among companies as to basic principles and, except where unusual conditions existed, there was considerable uniformity on general rules for most of the mining operations.

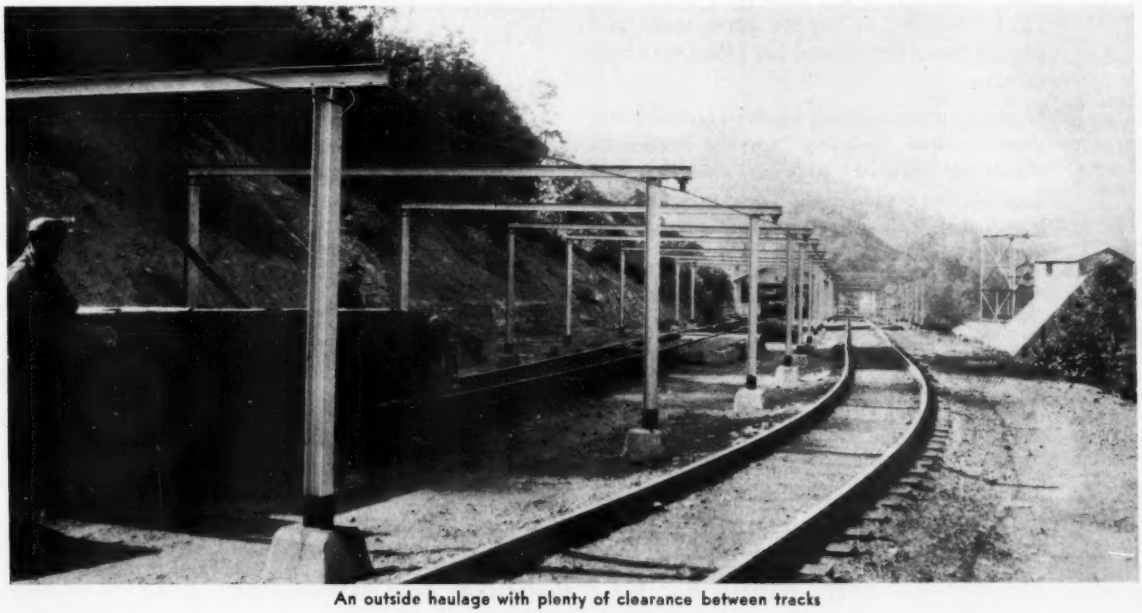
Coal Mine Explosions

Explosions can only be prevented by a realization that their basic cause is the creation of an explosive condition; whether this be through gas, coal dust or a combination of the two. It is a matter of secondary importance as to whether the actual ignition is caused by electricity, blasting or even matches, and an explosive condition can just as well arise in a hand-loaded mine as it can in an operation with mechanical loaders or conveyors; or, for that matter, in a home kitchen if there is a leaky gas valve. However, even in the best ventilated and regulated mines, a pocket of gas might be unexpectedly encountered or some unforeseen occurrence might raise a cloud of coal dust, so a secondary safeguard is provided by eliminating practices which could cause an ignition if an explosive condition happened to exist. But, in spite of all precautions, a combination of circumstances might arise where an initial explosion would occur and a third safeguard lies in the adoption of means to prevent its propagation and spread.

The purpose of the committee should be to clarify and crystallize in the minds of the men who from day to day are handling the safety of our operations the things which may cause the same type of accidents or catastrophes that have happened before, so that these men can take the precautions needed to prevent a similar occurrence. Every mine explosion in the last 20 years, and probably before that, has been investigated and analyzed by state and federal inspection departments and reports on the causes have been made. It is probable that these reports contain all possible factors responsible for mine explosions and it was suggested that an extract or tabulation be prepared to present this record in an easily understandable form. Such a compilation placed in the hands of each company official would serve to call his attention to hazards which might exist in his own mine that could be eliminated or at least could be carefully guarded.

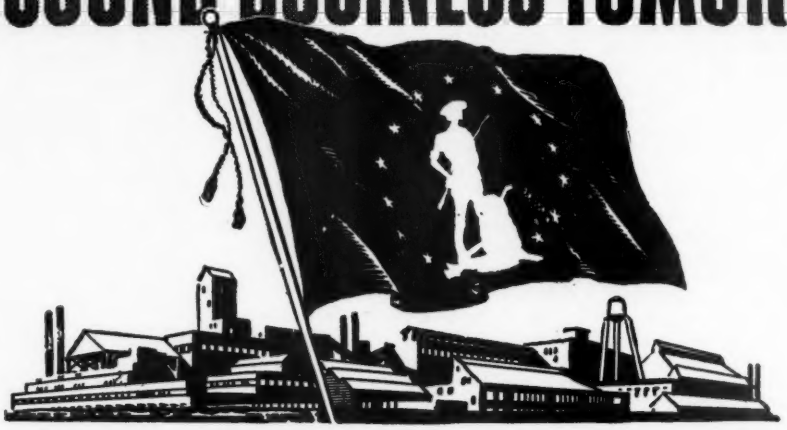
Conclusion

The foregoing briefly summarizes the consensus of the Safety Committee meetings, and in the near future subcommittees will be appointed to carry out the five studies proposed. In this connection, it was agreed that the usual procedure of the Coal Division would be followed; reports submitted would be reviewed and approved by special subcommittees or by the entire committee (as the case may be) before publication by the American Mining Congress. Such reviews can to a large degree be carried on by correspondence between the members, and, in order to conserve time and reduce travel, meetings will be held to a minimum of necessity. In preparing the reports, it is understood that no recommendations will be in conflict with state or federal action; neither will there be any attempt on the part of the committee to force upon the coal industry the acceptance of recommendations that will be made. Our object is to present accounts of best practices and approved methods in the hope that such accounts will serve our common purpose—to reduce accidents and injuries in mining. We are being asked for greater coal production; this means more man-hours of exposure and the increased exposures, particularly with untrained men whom we are forced to employ, will cause an increase in injuries, with consequent lost time and lost tonnage unless preventative measures are taken.



An outside haulage with plenty of clearance between tracks

FOR VICTORY TODAY
AND SOUND BUSINESS TOMORROW



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It means that billions of dollars are being diverted from "bidding" for the constantly shrinking stock of goods available, thus putting a brake on inflation. And it means that billions of dollars will be held in readiness for post-war readjustment.

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THE MINING CONGRESS JOURNAL

Wheels of Government

As Viewed by A. W. Dickinson of the American Mining Congress

INCUMBENT Senators and Congressmen at home over the holiday, as well as those newly elected, have been receiving a vociferous earful, an outpouring of protests from constituents on the sins of commission, omission and error by those officials in the Federal agencies who would regiment every detail both of the emergency and post-emergency activities of the American people including the daily doings of the small business man, the farmer and the stock grower. An example of this is the mileage and gasoline fiasco which resulted in the abandonment of the Office of Defense Transportation control center in Detroit and its 2,000 employes. It is now announced that further truck, bus and service car mileage allowances will be handled by the nearly 200 field offices of ODT and that 500 additional agents will be sent into communities throughout the country where they will establish offices through such local organizations as may be available. The deplorable failure of this Detroit control office has caused a furore throughout the country which has crystallized into a feeling of resentment and distrust, and it is with deep concern over this and other mismanaged efforts that Congressional delegations are returning to Washington from the highways and byways.

Even though Administration officials have moved quickly to take common-sense measures to stem the tide of disapproval it is quite apparent now that members of the legislative bodies will be cold-eyed and straight-lipped in their consideration of many of the proposals which are placed before the 78th Congress. They will stand united to win the war but they are sure to demand straight-forward, simple procedure and a trust in the American people in the conduct of ordinary domestic affairs.

Collecting Taxes

Concerned over the problem of income tax defaults by individuals, congressional and administrative sources are voicing proposals for some form of a pay-as-you-go tax arrangement. Senator Clark of Missouri, chairman of a Finance Subcommittee which considered the Ruml plan, is working on a bill and Chairman Doughton and some of the members of the House Committee on Ways and Means are reported to be in favor of tax collection on a current-year basis.

Additional revenues will undoubtedly be sought by the Treasury, which last year was emphatically turned down on its "spendings tax" proposal. A general sales tax and an increased withholding rate under the Victory Tax, combined with compulsory savings, are distinct possibilities for the 1943 Revenue Act.

The Treasury, after officially insisting that the 5 percent Victory Tax must apply to "wages paid on and after January 1, 1943," has now ruled that the tax is not assessable for payroll periods ending on or before December 31, 1942. The official Treasury statement contains in part the following words: "If the payroll period ends on December 31, 1942, the established monthly payroll period ending on the last day of the month, no withholding will be required."

Proclamations on Manpower

The Presidential proclamation of early December has apparently slowed down the Congressional demand for an all-encompassing manpower bill. By Executive Order WMC Chairman McNutt has taken over control of the Selective Service System and also of the right to hire, recruit and transfer labor for war industries. Except in cases of special qualifications needed by the armed services all voluntary enlistments of men between 18 and 38 are out. All hiring or recruiting of labor is to be done through or with the approval of the U. S. Employment Service, and no employer may continue to hold in his organization any employe whose services are more urgently needed in more essential industry. Another aid to essential industry is seen in the limitation of the draft age to men of 38 years.

A soldier over 38 years of age may now initiate action to obtain his discharge from the Army under the following conditions: (1) his request for discharge must be voluntary and in writing; (2) he must demonstrate that because of his age his usefulness in the Army is secondary to that in industry; (3) and he must present satisfactory evidence that he will be employed in essential war industry upon discharge.

The Manpower Branch, Civilian

Washington Highlights

78TH CONGRESS: Gets an earful from the grassroots.

ADMINISTRATION GETS BUSY: To stem tide of disapproval.

MEXICAN TRADE TREATY: Mining in the role of "Good Neighbor."

COMING UP: Pay-as-you-go tax collections.

VICTORY TAX: Effective January 1, 1943.

MANPOWER: McNutt takes over Selective Service.

SOLDIERS OVER 38: You are on your own.

CONSTRUCTION DROP: Will free million workers this year.

PRIORITIES: Mining gets higher ratings.

SILVER: Plenty for the war effort.

PEACE-TIME MONEY: Uncle Sam owns 70 percent of world's gold and 60 percent of the silver.

Personnel Division, of the War Department has also issued an Information Bulletin under which any inducted or enlisted soldier who was a key man in an essential war industry may be released to an employer who makes application and who proves that the man's services are definitely necessary.

WMC also announces that it is now prepared to impose "sanctions" to compel employers holding war contracts to release skilled personnel to other plants where deemed necessary. This would be accomplished by cutting off raw materials, equipment and supplies from operations considered less essential to the war effort.

Except for the importation of 3,000 Mexican agricultural workers, efforts thus far to secure miners and track laborers from that country have been unavailing. It is said that Mexican officials do not look with favor on the recruiting of industrial workers as they feel that this might jeopardize the operation of their own mineral producing and transportation operations. It is also known that there is definite opposition on the part of labor representatives in the United States.

A crumb of reassurance on the labor shortage problem is contained in a Department of Labor report which states that employment on new construction in 1943 will drop to an average of a little more than a million workers, or approximately half of the number employed in 1942. Such projects have taken many hundreds of men from the mines in the West and it is understood that the return of mine employes from this source has already been of considerable help.

1943 Priority Ratings

While the struggle to secure materials is becoming increasingly difficult for mining companies and for the manufacturers of mining machinery and equipment, it is encouraging to note the priority ratings announced by the Mining Equipment Division in mid-December which will apply to the quotas for the first quarter of 1943. In general, production materials and operating supplies for the manufacture of new mining equipment will carry an AA-1 rating for 50 percent and AA-2X for the remaining half, a rating of AA-1 will apply to maintenance and repair of the manufacturer's plant. An AA-1 is also assigned 100 percent to materials entering into the manufacture of repair and replacement parts for the mines. Metal mines and smelters are granted an AA-1 for maintenance and repair materials and operating supplies; coal and non-metallic mines have an AA-1 for maintenance and repair and an AA-2X for operating supplies.

These are the highest ratings that the mining industry has as yet enjoyed, as the best accorded in 1942 were AA-3 for manufacturers' materials, AA-2X for mines' maintenance and repair, and A-1-a for operating supplies.

The Mining Equipment Division under Director Arthur Knoizen is organizing three committees of representative men, from the coal industry, from the metal and non-metallic mining and smelting industries, and from the manufacturers of mining machinery and equipment.

Mexican Trade Treaty

Under consideration for nearly a year the Trade Treaty with Mexico, officially designated as a Foreign Trade Agreement, was signed on the 23rd of December. It becomes effective 30 days after proclamation by the Presidents of the United States and of Mexico. It is anticipated that the proclamation will issue early in January.

Including an oil import-excise reduction from ½¢ to ¼¢ per gallon and cancelling the quota restrictions on imports of Mexican crude and fuel oil, the treaty also reduces duties on zinc ores, slab zinc, zinc sheets, zinc oxide and zinc sulphate; lead ores, bullion and pig lead; fluorspar, and molybdenum ore or concentrates. On graphite the 5 percent ad valorem duty is bound against increase; antimony ore and sulphuric acid are bound on the free list.

A tabulation of commodities of interest to the mining industry and their respective duties is given elsewhere on this page.

An innovation in this trade treaty are the full or nearly full restorations to present duties which are to be made "30 days after the termination of the unlimited national emergency proclaimed by the President . . . on May 27, 1941." Thus recognition is given to the vigorous contentions voiced by the Secretary of the American Mining Congress before the Committee for Reciprocity Information as well as the State Department for specific wording, over and above the "escape" clauses, to restore duties at the end of the war.

In the original listing of metals subject to negotiation for reductions in duty quicksilver and antimony were named, but in the treaty no reductions were made on these important strategic metals. Although listed for duty negotiation in the pending Bolivian Trade Agreement the important strategic metal tungsten was not involved in the Mexican Agreement.

Silver for All

While the bill by Senator Green of Rhode Island to authorize the sale of unpledged Treasury silver at an average price of not less than 50 cents an ounce died with the adjournment of the 77th Congress, Senator McCarran offered some very interesting substitute amendments before the curtain was rung down.

The first measure offered by the Nevada Senator authorized the Treasury, upon recommendation of WPB, to sell unpledged silver for consumption in uses contributing directly to the war effort, at the established price of 71.11 cents an ounce. Pledged silver could be used for bus bars and other war plants service and returned

(*Continued on page* 48)

FOREIGN TRADE AGREEMENT WITH MEXICO

Commodity	*Present Duty*	*Reduced Rate*	*Post-war Rate*
Zinc oxide, dry	1¾¢ per lb.	1 1/10¢ per lb.	
Zinc oxide, wet	2¼¢ per lb.	1½¢ per lb.	
Zinc sulphate	¾¢ per lb.	½¢ per lb.	
Acid fluorspar (97%+CaF_2)	$4.20 per ton	Bound against increase	
Metallurgical fluorspar	$8.40 per ton	$6.30 per ton	
Graphite	5% ad valorem	Bound against increase	
Molybdenum ore or concentrates	35¢ per lb. Mo content	17½¢ per lb. Mo content	
Sulphuric acid	Free	Bound on free list	
Antimony ore	Free	Bound on free list	
Lead bearing ores, flue dust and mattes	1½¢ per lb. Pb content	¾¢	1⅕¢
Lead bullion, pig, bars, etc.	2⅛¢ per lb.	1 1/16¢	1 7/10¢
Zinc bearing ores	1⅕¢ per lb. Zn content	¾¢	1⅕¢
Slab zinc and zinc dust	1⅖¢	⅞¢	1⅖¢
Zinc sheets	2¢	1¢	2¢
Zinc sheets, coated or plated with nickel or other metal	2¼¢	1⅛¢	2¼¢
Old and worn out zinc, zinc dross and zinc skimmings	1½¢	¾¢	1½¢
Crude metallic mineral substances not specially provided for	Free	Bound on free list	

Cracking Hard Rock on "The Hill"

Mining Congress Journal will furnish readers, upon request, with official Government statements on any of these brief summarized announcements

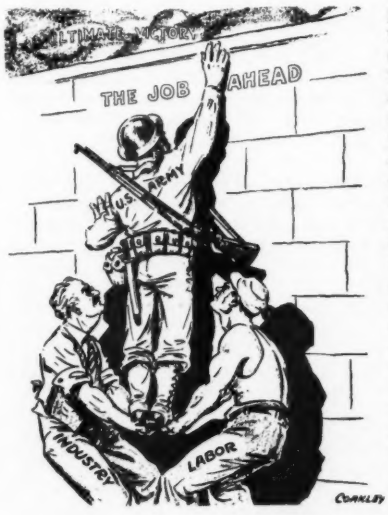
METAL

Calcium Carbide Under Allocation Control. War Production Board. Calcium carbide is placed under allocation control through Order M-190, effective January 1. Deliveries are prohibited without specific authorization except in the case of monthly shipments of 10 tons or less.

2,000-Family Miners' Dwellings Being Built. National Housing Agency. More than 2,000 family dwellings to meet the urgent housing needs of nonferrous metal mining and smelting communities in six western states have been authorized and already are under construction, Administrator Blandford announced.

Cobalt Placed Under Tighter Control. War Production Board. Cobalt, one of the important steel alloys, was placed under tighter control December 11 by General Preference Order M-39, as revised by the Director General for Operations.

Copper Regulation Explained by WPB. War Production Board. In explaining press release OPA-T-264, WPB makes it plain that, if necessary, government will requisition all copper and copper base alloy products in primary form except those whose cost to the holder was above the 28- and 30-cent maximums mentioned in copper price schedules and all copper and base alloy fabricated products, except those which have been fabricated from primary forms whose cost to the holder was above the 28- and 30-cent maximums.



--WASHINGTON POST

Geological Survey Makes Annual Report. Department of the Interior. The work of the Geological Survey during the 1942 fiscal year was effective against the enemy on military fronts abroad and on the production lines at home, it is revealed in its annual report submitted to Secretary Ickes.

Zinc Conservation Ideas Approved. War Production Board. The Conservation Division approved recommendations adopted by the Advertising Club of Washington for reducing the use of zinc in engravings designed for newspaper use.

Prices Fixed for Mine, R. R. Timber. Office of Price Administration. Dollars and cents maximum prices for mine timber, industrial blocking and railroad ties in 15 western states were announced today by OPA. The products are covered in MPR-284—Western Primary Forest Products—effective December 18.

Bureau of Mines Makes Annual Report. Department of the Interior. Discovery and exploration of millions of tons of domestic minerals, development of metallurgical processes, a threefold increase in helium production, wider utilization of American coals, headed the list of accomplishments for the Bureau of Mines in the 1942 fiscal year, according to the annual report of Director Sayers to Secretary Ickes.

COAL

Consumers to Pay 4 Percent Tax on Coal. Office of Price Administration. Consumers of all grades of coal and other solid fuels will pay the 4 cents per net ton transportation tax imposed by the Revenue Act of 1942 effective December 1.

Rail Coal Shipments to East up. Office of Solid Fuels Coordinator. This year's all-rail coal shipments to New England to meet that area's war-expanded fuel needs and replace fuel oil are approximately 4,500,000 tons (about 33⅓ percent) ahead of last year, Coordinator Ickes said. Total 1942 shipments are estimated at 16,777,000 tons as of November 28, compared to 12,215,000 tons in the comparable period last year.

Bituminous Coal Order Amended. Office of Price Administration. Suppliers delivering bituminous coal direct to ships' bunkers may be entitled to increases in their maximum prices when those prices are so low as to threaten the availability of adequate supplies to ships, the OPA rules through Amendment 3 to Maximum Price Schedule 189, effective December 5.

Bituminous Price Order Amended. Office of Price Administration. A bituminous producer whose maximum price for coal delivered by truck is shown to be lower than his standard price for such deliveries in October, 1941, may be eligible for price increases approximating the amount of the difference, according to Amendment 28 to MPR 120, effective December 22.

Domestic Coal Price Established. Office of Price Administration. A premium on exported bituminous coal and a domestic price base for bituminous coal shipped to foreign markets was established by the OPA through Amendment 4 to Revised Maximum Export Price Regulation, effective December 19, 1942.

Coal Adequate to Replace Fuel Oil. Office of Solid Fuels Coordinator. The coal industry, if given adequate equipment, transportation and manpower, can supply the 15,340,000 tons of coal that would be needed annually to replace fuel oil in the East and Midwest under present conversion goals, Coordinator Ickes said.

Stored Anthracite Regulation Clarified. Office of Price Administration. Anthracite coal held temporarily in ground storage facilities pending final delivery is considered "in transit" and is to be governed by the same regulations as anthracite delivered direct from mine or preparation plant, it is ruled in Amendment 9 to MPR 112 (Pennsylvania Anthracite) effective December 21.

Coal Program Making Progress. Office of Solid Fuels Coordinator. Summing up a year's activity in the wartime coal program, Coordinator of Solid Fuels Ickes said that progress was being made in stepping up the country's soft coal production by an estimated 30,000,000 tons in 1943 to meet the Nation's war aims.

Longer Soft Coal Mine Hours Urged. Office of Solid Fuels Coordinator. Coordinator Ickes made public letters in which he asked workers and operators in the bituminous coal mining industry to settle their controversy and act to carry out his request of September 29 to lift the present 5-day, 35-hour weekly limitation on the hours of labor in the mines.

Harlan Stoker Coal Price Increased. Office of Price Administration. The maximum price for stoker coal moved by truck from Harlan County, Ky., mines is increased approximately 65 cents a ton in Amendment 29 to MPR 120 (Bituminous Coal Delivered from Mine or Preparation Plant) effective December 26.

NON-METALLICS

Graphite Distribution Under Control. War Production Board. Complete control over distribution and use of graphite will be effected by Conservation Order M-61, as amended by the Director General for Operations.

Lithium Ores Under Total Allocation Control. War Production Board. Lithium ores are put under complete allocation and use control by General Conservation Order M-253, issued and effective as of December 5.

Domestic Mica Allocation Control Broadened. War Production Board. Allocation control over domestic mica started December 10, as a result of amended Conservation Order M-101.

Maximums for Sale of Mica Set. Office of Price Administration. Maximum prices at which Metals Reserve Co., a Government procurement agency, may sell certain grades of Indian mica splittings to American industry are established in Order 138 under Section 3 (b) of the GMPR, effective November 14.

New Building Uses for Gypsum Being Explored. War Production Board. Federal agencies engaged in necessary war construction are turning to the use of non-critical materials as substitutes for metal and lumber. Among those available for the purpose and at the same time adaptable to unusual construction demands is ordinary gypsum.

Essential Asbestos Textiles Assured. T-1386. War Production Board. Additional asbestos textiles for the armed forces and for essential industrial uses were provided on December 14, with the issuance by the Director General for Operations of Conservation Order M-123 as amended.

EQUIPMENT

Welding Rod Distribution Control Revoked. T-1353. War Production Board. The limited control of the distribution of welding rods and electrodes affected by Order L-146 was abandoned on the issuance on December 9 of a revocation of L-146.

Aluminum Purchase Authorization Changes Told. T-1368. War Production Board. Deputy Director Krug announced certain changes in the method of authorizing PRP units to purchase aluminum, magnesium, steel and copper during the first quarter of 1943, designed to facilitate the transition from PRP to the Controlled Materials Plan.

GENERAL

Nation's Employers to Get "Manning" Tables. War Manpower Commission. WMC and the Selective Service System are helping bosses of the nation's war plants and essential activities to draw up blueprints from which they can plan and work out their prime manpower problem in the form of manning tables, to be distributed by the regional offices on request to employers.

--CHARLESTON DAILY MAIL

Tinplate Quotas Set for Canned Food Packing. War Production Board. The extent to which critical materials such as tin and steel can be used for cans during 1943 is set forth in Order M-81, as amended December 10, which (1) limits the use of tinplate, terneplate and blackplate for packing food and non-food products in cans; (2) specifies can sizes, and (3) establishes packing quotas.

Ideas Increasingly Important, Workers Are Told. War Production Board. New ideas on production, springing from the mechanical genius of the man at the machine, will become even more important during the coming year in expanding our output of war goods, Chairman Nelson stated December 10 at a luncheon honoring ten workers who had been presented War Production awards.

Copper Chemicals Program Discussed. War Production Board. A program to assure an adequate supply of copper chemicals for all essential agriculture needs during the coming year was discussed at the initial meeting of the Copper Fungicide Manufacturers Industry Advisory Committee of the Chemicals Division, WPB held Thursday, December 17, in Washington.

Students in Technical Fields Deferred. War Manpower Commission. Temporary deferment for college and university students and instructors in certain medical, engineering, and other technical fields is authorized in a new bulletin to local Selective Service Boards, enlarging previous deferment provisions, Chairman McNutt of the WMC announced today.

Strategic Materials Import Control Tightened. War Production Board. In a move designed to tighten import control of strategic materials, WPB announced a revision of the General Imports Order, M-63, effective December 28, eliminating the exemption in favor of importations of List I and II materials under existing contracts.

PERSONALS

Alvaro de Paiva Abreu, mining and civil engineer of the National Department of Mineral Production in Brazil is in the United States visiting preparation plants in the anthracite and bituminous coal mining districts. Mr.

Abreu is assisting Thomas Frazer of the Bituminous Coal Division, U. S. Bureau of Mines, in determining the washing characteristics of the various coal deposits in Brazil. Mr. Abreu expects to remain until March, and he can be reached through the Brazilian Embassy, Washington, D. C.

T. E. Mitchem has been named superintendent of mine No. 20 of the Island Creek Coal Company, Whitmans, W. Va.

Election of four new members to the Board of Trustees of Industrial Hygiene Foundation, which recently held its seventh annual meeting at Mellon Institute, Pittsburgh, are announced. They are: **Ned H. Dearborn,** Executive Vice President, National Safety Council; **Prof. Philip Drinker,** Harvard School of Public Health; **Lt. Col. A. J. Lanza,** M. C. Chief, Occupational Hygiene Branch, U. S. Army; **Dr. C. D. Selby,** Medical Consultant, General Motors Corporation.

D. G. Price, former secretary of the Johnstown Retail Coal Producers' Association, Johnstown, Pa., has accepted a position as Price Examiner in the Marketing Branch of the Bituminous Coal Division, Washington, D. C.

W. B. Combs, formerly mine foreman at No. 4 mine of the Pond Creek Pocahontas Co., Bartley, W. Va., has been promoted to mine inspector. He was succeeded by **J. M. Farley,** former section foreman.

After 17 years service as professor of metallurgy and ore dressing at the University of Arizona, **J. B. Cunningham** has been advanced to the headship of his department. He succeeds **Dr. T. G. Chapman,** dean of the University's College of Mines, who retained direction of the department when he became dean two years ago. Professor Cunningham came to the Arizona University in 1925, and for six years prior to that date had been head of the department of metallurgy at Michigan College of Mines.

H. W. Clarke, vice president, McGraw-Hill Publishing Company, New York, and publisher of Engineering and Mining Journal, Coal Age and five allied publications, withdrew from his position with the company December 31. Mr. Clarke's address is 385 New Rochelle Road, Bronxville, N. Y.

Erle V. Daveler, who for the past 12 years has been vice president and treasurer of the Utah Copper Company and Nevada Consolidated Copper

Corporation, has resigned these positions, and for the present is located at the Charles Hayden Foundation, 25 Broad Street, New York, of which he is a Trustee. Mr. Daveler was also assistant to D. C. Jackling, president of the copper companies above referred to.

For the past 10 years Mr. Daveler has been chairman of the Finance Committee of the American Mining Congress, and has rendered signal service to the mining industry in building up the finances of its national organization.

American Pulverizer Company, of St. Louis, Mo., announces the appointment of **Howard L. Hill,** 101 Park Ave., New York City, as their eastern representative.

William C. Carter, for 14 years vice president, and for the past year executive vice president of Link-Belt Co., has been elected president of the company, effective December 31, to succeed Alfred Kauffmann, who has resigned because of ill health. Mr. Kauffmann remains a member of the board of directors.

Mr. Carter joined the Link-Belt Company in 1902 as a draftsman. A graduate of the University of Illinois, he has been in complete charge of company affairs since Mr. Kauffmann's illness. Mr. Kauffmann, who has been with the company for 41 years, rising from draftsman in 1901 to president in 1924, is retiring from active service.

B. P. Spann, for the past eight years advertising manager of the Gardner-Denver Company, Quincy, Ill., has received his commission as lieutenant,

junior grade, in the Supply Corps of the U. S. Naval Reserve, and is now stationed in Philadelphia. On leave of absence from the Gardner-Denver Company, Lieutenant Spann will resume his duties as advertising manager after the war.

Wm. H. Hax, president, Jardine Mining Co., Jardine, Mont., left recently for a business trip to Washington and New York.

John W. Buch, former assistant professor in the Department of Mining Engineering, Pennsylvania State College, has been named chief of the

Coal Economics Division of the Bureau of Mines.

A branch of the Bureau's Economics and Statistics Service, the Coal Economics Division is assisting the Office of Solid Fuels Coordinator, the Army,

the Navy, and other war agencies and various war industries by preparing weekly, monthly, annual and special reports on developments in the field of solid fuels, including production, stocks, shipments, and consumption of anthracite coal and coke.

J. van den Brock, formerly president of the Tin Processing Corporation, operating The Defense Plant Corporation's smelter in Texas, has been appointed Finance Minister of the Netherlands, with headquarters in London. **J. van der Berg,** manager of the tin smelter has been named president of Tin Processing Corporation.

Victor Bongard, recently general manager of Cardinal Gold Mining Co., Bishop, Calif., has joined the staff of Fresnillo Co., Fresnillo, Zacatecas, Mexico.

Wallace Lowry, geologist with the Oregon State Department, and George Murphy, associate, are mapping manganese formations in the state.

Andrew Rostosky, Jr., Pittsburgh Coal Company scholarship student in coal mine engineering, graduated with high honors at the Pennsylvania State College, State College, Pa., during

commencement exercises December 17. Mr. Rostosky was elected a John W. White fellow, the highest honor of this kind that can be conferred on a graduating senior. This award carries a stipend of $600 for specialized graduate study at any American college.

Mr. Rostosky comes of a coal mining family, and has been a member of the United Mine Workers of America Local at Library, Pa., since starting to work in the mines.

Robert Weir, formerly connected with the Bell & Zoller Coal & Mining Co., has been appointed assistant director of the department of mines and minerals for Illinois. He succeeds **Joseph Marchesi.**

On the closing December 31, 1942, of the San Francisco office of Minerals Separation North American Corporation, **J. V. Quigley,** formerly connected with the company can now be reached at 1531 Atlas Road, Napa, Calif.

At a recent meeting of the Board of Directors of The Marion Steam

Shovel Company, **John P. Courtright,** formerly director of sales, was named vice president in charge of sales.

A. J. McBride, Jr., of the Pocahontas Fuel Co., Inc., has moved to Bluefield where he will be with the sales department of the company.

Grover J. Holt, formerly assistant to vice president, Butler Brothers, is now with the Cleveland Cliffs Iron Company at Ishpeming, Mich.

Gordon Cooke, president, The Delaware, Lackawanna & Western Coal Co., New York, and **Carter H. Schupp,** Chicago representative of the company, recently made a visit to the Smokeless coal fields, West Virginia.

Charles E. Wilson, Vice-Chairman of the War Production Board, and **Harry J. Carmichael,** Coordinator of Production of Canada's Department of Munitions and Supply, have been appointed co-chairmen of the Joint War Production Committee of the United States and Canada. Mr. Wilson succeeds **James S. Knowlson** as American chairman and Mr. Carmichael succeeds **G. K. Sheils** as Canadian Chairman.

At a meeting of the directors of the Hecla Mining Co., in Spokane, **George P. Mayer,** of Milwaukee, Wis., was elected a director in place of his father, the late George P. Mayer. Other Milwaukee directors in attendance at the meeting were **W. L. Barth** and **C. L. Kipp.** Other directors are **A. W. Witherspoon,** of Spokane; **L. E. Hanley,** president and manager, and **Leo Hoban,** secretary, both of Wallace.

Alvin J. Thompson, professor of mining and metallurgy at the University of Arizona, has resigned to join the research staff at Battelle Memorial Institute, Columbus, Ohio. His new work will be in the hydro-metallurgical field. A graduate of the Arizona University, Professor Thompson had been a member of its faculty since 1935.

Harry Quenon has been made superintendent of Keystone mine, Koppers Coal Division, Eastern Gas & Fuel Associates, Keystone, W. Va.

D. L. Beeman has been appointed engineer, Industrial Power section, succeeding **E. G. Merrick,** and **R. S. Sage** has been named engineer, Mining section, succeeding **F. L. Stone,** it was announced recently by **J. D. Wright,** manager of General Electric's Industrial Engineering department. Mr. Merrick and Mr. Stone, both of whom have been associated with the company for many years, will continue in their respective sections with specially assigned duties and as engineering consultants.

— *OBITUARIES* —

Myron Reed Walker, mining engineer and mineral economist, widely known in the United States and in Latin America, died at his home in Washington, D. C., January 5. Mr. Walker has been a resident of Washington since 1923 when he came here to take a place on the staff of the Metals Division of the U. S. Tariff Commission.

Prior to coming to Washington, Mr. Walker had operated mines in various Latin American countries and had served as a consulting engineer on many important mining enterprises in practically all of Latin America. At one time he was chief engineer for the Cerro de Pasco Copper Corp. in Peru. He took an important part in the development of mines in the State of Oaxaca, Mexico.

Mr. Walker was born in Milwaukee, Wis., November 25, 1880. He was educated at Colgate University and Michigan College of Mines.

He is survived by his widow, Mrs. Vitaline Walker; two daughters, Mrs. Delphine Ruth Reed, of New York, and Mrs. Margaret Hunt, of Washington; and a son, Robert Leonard Walker, of Pittsburgh.

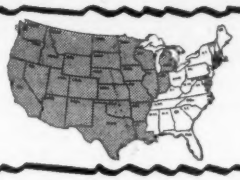
Robert Haven Gross, for a quarter of a century a leader in the development of this country's copper and coal industries, died December 21. Mr. Gross retired a few years ago as president of the New River Company of West Virginia, after an extremely active career which had extended his influence into many companies.

Besides being president of the New River Company he had served as a director of the East Gulf Coal Company, the Clear Creek Coal Company, the Copper Range Company and the Bank of Mount Hope in West Virginia. He also had been president of the East Butte Copper Company and had served as executor for the William A. Paine estate.

Donald E. Cummings, 42, head of the Department of Industrial Hygiene at the University of Colorado, was among the victims in the crash of a transport liner near Salt Lake City, Utah, on December 15. Mr. Cummings, one of the nation's foremost industrial hygienists, was long associated with **Dr. L. U. Gardner** at the Saranac Laboratory and was widely known for his research and field work.

News and Views

Eastern States



Occupational Bulletin for Coal Mining Revised

On December 15 the Selective Service System issued a revision of Occupational Bulletin No. 4, covering coal mining, preparation, and activities preparatory to coal mining operations.

Late in July, the cooperation of the American Mining Congress was requested by the Occupational Analysis Section of the U. S. Employment Service in providing a complete list of critical occupations and training requirements for coal mining. Comprehensive information submitted to American Mining Congress by leading producers was furnished to the Employment Service, and the Mining Congress has since worked closely with them in their study of coal mining occupations.

The revised bulletin contains a list of 53 key or "critical" occupations, each requiring more than six months experience or training.

While the lowering of the upper draft age to 38 will retain for the industry many men in the 38 to 45 age bracket, it is evident that increased attention will be needed to hold the services of essential mining men in the 18-38 group. Employers must continue to make every effort to train replacements for the draft-eligible workers, and at the same time to secure deferments for necessary men in critical occupations.

The revision of the occupational list for coal mining will require corresponding changes in the draft records of certain employes, and employers are cautioned to check with the draft boards and to enlist the aid of the local U. S. Employment Service in securing proper interpretations as may be necessary.

CRITICAL OCCUPATIONS

COAL MINING

Accountant, Cost
Battery Starter
Blacksmith (All Around)
Blaster
Boilermaker, Maintenance
Brakeman (Underground)
Brattice Man
Cager
Car Builder
Carpenter (All Around)
Cutting Machine Runner
Chemist
Churn-Drill Operator
Conveyor Man
Crane Operator
Crusher Man
Dispatcher
Driller (All Around)
Electrician (All Around)
Engineer, Industrial Locomotive
Engineer, Power House
Engineer, Professional and Technical
Fire Boss
Foreman
(This title covers foremen who are actually engaged in supervisory duties in connection with coal mining activities described above and who exercise independent judgment and assume extensive responsibility for the product. It does not include straw bosses or laboring gang foremen.)
Harnessman
Hoisting Engineer
Inspector, Coal
Inspector, Mine
Inspector, Shot Firing
Lathe Operator (All Around)
Loader, Machine
Machinist (All Around)
Manager, Employment and Personnel
Manager, Production
Manager, Traffic
Mason
Mechanic, Maintenance
Mine Motorman
Miner (All Around)
Pipe Fitter
Power Shovel Operator
Preparation Engineer
Pump Operator
Shaft Repairman
Shuttle-Car Operator
Stationary Engineer
Tipple Engineer
Superintendent
Surveyor, Mine
Timberman
Trackman (Underground)
Truck Driver, Heavy, Stripping Operations
Welder (All Around)

WEST VIRGINIA

»»» A. J. Bartlett, director of safety, Island Creek Coal Company, Holden, W. Va., announced recently that honor certificates and five-year honor emblems were awarded to 174 employes who have completed five years of continuous service without a lost-time injury. The most recent awards covered the period from January 1, 1937, to December 31, 1941. In normal times, the five-year honor emblem is bronze, but silver emblems are being used now because bronze is a critical war material. Silver also is used for the 10-year honor emblems, and gold is used for the 15-year honor emblems.

»»» Purchase of the Colcord Coal Co. and its entire properties by the American Rolling Mills Co. was announced late in December by Charles Conner of Nellis, general manager of Armco's coal division. The price involved in the steel company's acquisition of all capital stock of the company, which has three operations in Raleigh county producing an estimated 840,000 tons of coal annually, was not made public. J. B. Miller of Ashland, Ky., is president of the new company. Other officers are: Charles

Conner, first vice president; F. C. Colcord, second vice president; M. B. Brawley, Middletown, Ohio, treasurer, and W. D. Virkis, Middletown, secretary. The board of directors will consist of Miller, Conner, C. W. Verity, E. A. Correa, and C. L. Kinsbury, all of Middletown.

Mr. Conner said he would establish residence at Montcoal, and W. M. Davis, who has been superintendent of all mining operations will go to Montcoal as general manager of all mining operations. The company will increase production when necessary priorities are obtained for the purchase of additional mechanical equipment.

»»» Production at the Alaska Coal Co.'s new mine at Beelick Knob, Fayette county, West Virginia started early in January. The mine is expected to produce about 700 to 800 tons per day and employ approximately 150 miners. Owen Cox of the Laurel Smokeless and Greenwood Coal companies, is president of the new concern and T. R. Wilson of Quinninmont, secretary-treasurer.

MAINE

»»» Among the various States where the M. A. Hanna Company has been investigating ore deposits, it recently has added Maine to its list. A diamond drilling program is under way by the company in Aroostock County, Maine, prospecting a manganese deposit and it is reported that results obtained so far are encouraging.

MARYLAND

»»» In the recent report of Maryland Bureau of Mines for the calendar year 1941, it was stated that the various mining operators throughout the state accounted for a total coal production of 1,717,215 tons and 106,039 net tons of clay. Allegany County accounted for 1,012,891 tons of coal and virtually all the clay output. Coal production from Garrett County was 704,324 tons.

During the calendar year 1941, Allegany County employed 1,206 miners, 110 drivers (this includes motormen, brakemen, etc.), 211 inside laborers, and 114 outside employes, making a total of 1,641 men. On the basis of this county's coal output there was a production of 839 net tons of coal for each miner employed during this period.

In Garrett County there were employed 637 miners, 101 drivers (this includes motormen, brakemen, etc.), 72 inside laborers, and 106 outside employes, making a total of 916 men. A production of 1,105 net tons for each miner employed during this period was estimated.

In 1941, fire clay mines in Allegany County employed 116 miners, 11 drivers, 21 inside laborers and 30 outside employes, making a total of 178 men. The production of clay during the calendar year was 106,039.19 net tons, a substantial gain over 1940.

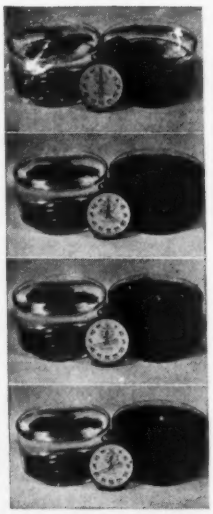
Trackson traxcavator loading limestone into trucks in quarry tunnel near Hershey, Pa.

OHIO

»»» The Pittsburgh, Lisbon & Western Railroad, which for years operated between Lisbon, Ohio, and New Gallilee, Pa., has filed an application with the Interstate Commerce Commission at Washington for permission to buy the 12-mile railroad owned by the Pittsburgh Coal Company operating between Negley, Ohio, and Smith's Ferry, Pa

The Pittsburgh Coal Company line was built a few years ago to bring river coal to Youngstown district mills.

»»» Following the purchase of the controlling interest in United States Coal Company, the M. A. Hanna Company has acquired the remaining capital stock and now owns 100 percent of United States Coal Company.



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Among its values are:

1. . . non-toxic, non-inflammable, without odor and in no way injurious to the user.
2. . . low freezing point; can be shipped and stored without difficulty during freezing weather.
3. . . entirely soluble in mine water, either acid or alkaline, without use of intricate mixing equipment.
4. . . wets dust surfaces instantly, but is permeable, thus permitting further penetration to underlying dust layers.
5. . . if used in connection with wet drilling, it increases speed of drilling.

Since "dust-killing" in mines is *the* thing to do, why not do it with COMPOUND M and do it better?

THE JOHNSON-MARCH CORPORATION
52 VANDERBILT AVE.
NEW YORK, N. Y. 1-JM-6

NORTH CAROLINA

»»» Establishment of a concentration plant to utilize North Carolina's lithium-bearing spodumene at King's Mountain was announced recently by Governor J. M. Broughton. The flotation plant will be built by the Solvay Process Company, of Syracuse, N. Y., largest producers of alkalies in the United States, and initially will cost several hundred thousand dollars. Production is expected to start in the second quarter of 1943.

The State Minerals Resources Division said the plant would produce spodumene concentrates and also some by-products for shipment to the company's processing plants. The deposits include quantities of feldspar, quartz and tin. The ore runs in a belt from the South Carolina line to Lincoln County. Solvay representatives have been prospecting this area for months.

Lithium is used as a hardener in bearing-metal alloys. It aids the conductivity of copper wire, and added to copper and aluminum, resists the absorption by these metals of gasses. Lithium salts are efficient as dehumidifiers, and lithium hydroxide is used in alkali storage batteries. Some compounds are used in certain glasses, glazes, and enamels, and in photography.

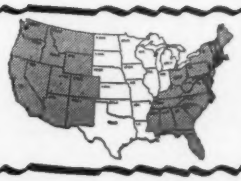
Scrap Collection Good in Coal Industry

»»» The anthracite industry is doing an outstanding job in collecting critically needed scrap metals, according to a statement issued recently by Paul C. Cabot, deputy director of the Conservation Division, WPB.

Anthracite mining operators, representing only 10 percent of the coal mining industry, are responsible for 24 percent of the total amount of scrap, according to reports from the coal mining industry as made to the Industrial Salvage Branch. Forty-three thousand tons of iron and steel, copper and other non-ferrous metal scrap have been reported by the anthracite industry in the first ten months of 1942.

"This performance," Mr. Cabot said, "is particularly notable when the demand for the production of millions of additional tons of coal is considered. The anthracite mines produced 54,000,000 tons of coal in 1941. The growing fuel oil shortage increased requirements for 1942 to 60,000,000 tons. With the shipment of English coal into Canada reduced to a new low due to the war, the anthracite coal industry may be asked to produce 65,000,000 tons in 1943, and ship 5,000,000 tons into Canada. In spite of all these additional burdens, the coal miners have been getting in the scrap."

Central States



OKLAHOMA

»»» The old Commerce Bird Dog mill about two miles west of Picher is being rehabilitated by the Eagle-Picher Mining & Smelting Co. Capacity of the plant is about 100 tons of ore an hour. It will treat zinc ores principally from Galena and Oronogo shipped by rail. It will also shorten some truck hauls now going to the Central mill. The plant is expected to be ready for operations in January. G. C. Niday, Miami, Okla., is Tri-State manager for the company.

MINNESOTA

»»» Iron ore shipments from the Lake Superior mining districts ended the season with an all-time record of over 90,000,000 long tons or about 15 percent higher than 1941's previous high of a little over 80,000,000 gross tons.

Minnesota mines furnished over 74,000,000 tons of the 1942 total; the remainder was shipped from Michigan-Wisconsin mines. Among the individual company figures available are the following:

Oliver Iron Mining Co., subsidiary of U. S. Steel Corp., established a new company record by shipment of over 40,000,000 tons of ore during 1942. Oglebay, Norton & Co., shipped nearly 2,000,000 tons in the season.

Pickands, Mather & Co., the only company shipping from all six of the Lake Superior ranges, shipped close to 18,000,000 tons in 1942. Shipments by the Republic Steel Corp. amounted to nearly 3,000,000 tons. Wisconsin Steel Mines, Hibbing, Minn., subsidiary of International Harvester Co., sent out a total of about 950,000 tons for the year.

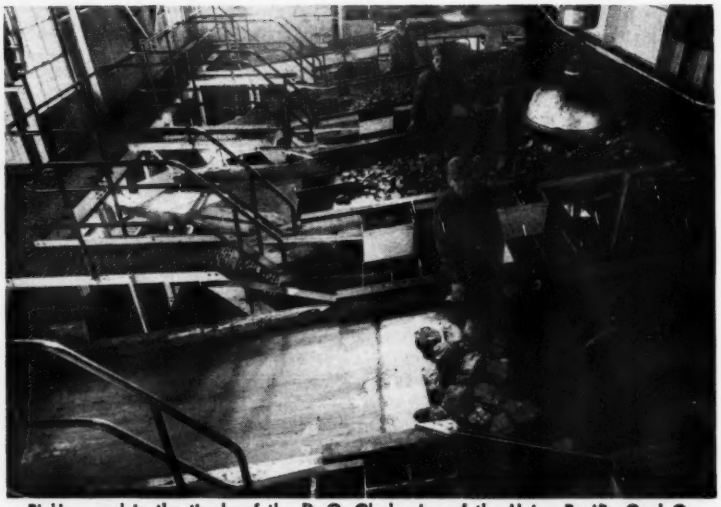
North Range Mining Co., Negaunee, Mich., shipped around 1,600,000 tons. Davidson Ore Mining Division of Pittsburgh Coke & Iron Co., shows shipments of 360,000 tons. Carl Hedman & Co., Hibbing, shipped 85,000 tons for the year. Shipments of Argonne Ore Co., Hibbing, totaled around 216,000 tons.

M. A. Hanna Co., active on five ranges, shipped nearly 5,000,000 tons of iron ore during 1942. A total over 4,000,000 tons was shipped by Lake Superior & Ishpeming Railway. Duluth, South Shore & Atlantic Railway Co. sent out around 680,000 tons. Shipments by Globe Iron Co., Iron Mountain, Mich., amounted to slightly above 64,000 tons of ore.

SOUTH DAKOTA

»»» The Homestake mine at Lead will be permitted to continue operations on a limited basis for six months after December 7, the date of the original WPB Order L-208 closing all gold mining operations in the United States, to provide miners for work in copper and other strategic mineral mines. The decision permits the removal of broken ore already in the

Presentation of the Army-Navy "E" award to the men and women of the Macwhyte Company, Kenosha, Wis.



Picking coal in the tipple of the D. O. Clark mine of the Union Pacific Coal Co., Wyoming

stopes and the refining of the gold, whereas the original order said that all operations must cease by December 7, except for maintenance crews, and that no new ore could be broken out after October 15.

TEXAS

»»» The new magnesium plant of International Minerals and Chemical Corporation in Texas recently started production, the third such plant to be built with funds provided by the Defense Plant Corporation since Pearl Harbor. All three were built by the Austin Company and use the Dow manganese process.

ARKANSAS

»»» Suspension of all activity relating to the attempt to utilize soft wad manganese ore reserves in the Batesville, Ark., district was announced early in January by the War Production Board. Investigation by a private company as agent for Metals Reserve Company has shown that the reserves of manganese ore were not as large as anticipated and that the practicable production rate would be lower and operating costs higher than originally expected.

In the opinion of WPB, no practicable method is now available for treating the low-grade ores found in the Batesville district, to produce even a sub ferro-grade manganese product at a price comparable to cost of production at other Government-financed projects in this country. The War Production Board does not consider it necessary to use materials or manpower to develop plants for processing these ores at this time.

About two years ago, when a manganese shortage threatened, study and exploration of the soft wad manganese ore reserves in the Batesville district was undertaken. These ores are a non-merchantable, low-grade by-product of the normal mining of higher grades in the district.

Subsequently, WPB recommended that Metals Reserve Company undertake more thorough exploration of these reserves, with the expectation that if sufficient reserves were developed, a plant for treating the ores would be erected in the district. The purchase of wad ores will be continued until the end of March to give local miners a limited time to liquidate their operations. The purchase of high-grade ores from the district will be continued indefinitely.

Wheels

(*Continued from page* 40)

to the Treasury, but no Treasury silver could be sold until current supplies of foreign and domestically mined silver are reduced to an aggregate stock of 20 million ounces, and silver sold but not actually used must be subject to Treasury repurchase after the war. Senator McCarran's further amendment, however, would make available 30 million ounces of silver per year for the exclusive use of silverware, jewelry and other domestic manufacturers, for the manufacture of articles for civilian use, and this silver (either foreign or domestic) would be sold by the various acquiring agencies of the Government other than the Treasury, at the current market prices.

At the hearings on the Green bill which preceded the rather extended Senate floor debate, Board Chairman Francis H. Brownell of the American Smelting and Refining Company, an outstanding authority on silver, testified that his company, in the month of November, 1942, sold to the Metals Reserve Company 2,075,000 ounces of silver because they were only able to sell to fabricators for war purposes 1,049,000 ounces. Said Mr. Brownell, "of our foreign production just about 45 percent of the total, and at the present time and all during the month of November only about one-third, has been required for war production purposes." When Senator Murdock of Utah asked "if the War Production Board would lift their restrictions for non-essential war purposes presumably the amount of foreign silver coming in at the present time would be enough to take care of all needs?" Mr. Brownell replied: "Yes, we would have it, for in November 2,075,000 ounces could have gone for that purpose."

Mr. Brownell told the Banking and Currency Committee that at the end of the present war one of the greatest problems we will be confronted with is the reestablishment of a monetary system which will permit a resumption of international trade; that we own over 70 per cent of the world's gold and over 60 per cent of its silver, and that we are "sitting pretty" for a trade around the council table as to the kind of money we want and the kind of international agreement that must be made upon it. He said that around that council table will be found India and China, with nearly half the population of the world and that they have to have silver—they do not have banks—they deal in five and ten and fifteen cents a day—and they cannot have gold for the amounts of money they handle. In the case of India, said Mr. Brownell, "undoubtedly, if Great Britain gives her the same status as Canada and Australia, India will have to have her independent money, such as these other colonies have. They will want silver. There is a great demand for silver over there today. They cannot meet their needs."

To Committee Chairman Wagner's pointed question: "You say there is much more silver than is needed for the war effort?" Mr. Brownell replied simply "Yes, sir."

New Official Personnel

The Office of Price Administration has appointed Dr. John B. Sumner as head of its newly consolidated Nonferrous Metals Branch which embodies the former Copper, Aluminum, and Ferro-Alloys Branch and the Zinc, Lead and Tin Branch. E. S. Glines and Carl Anderson are associated with Dr. Sumner and the five sections of the Branch and their chiefs are as follows: Basic metals and mining, O. C. Lockhard; ferro alloys, Donald Van Deusen; minerals and minor metals, Philip Woolfson; scrap and secondary metals, Thomas McManus; and fabricated and manufactured products, Orrin McCorison.

WAR POSTERS

Among the war posters printed in 1942, each told an effective story. As we enter the second year of war, new posters will meet the eye and carry many timely and important war messages to everyone.

On this page and on page 51 are reproduced four of several prize winning posters selected in the National War Poster Competition, conceived by Artists for Victory, Inc., which is the parent organization of 26 societies, with a membership of over 10,000 artists, dedicating their talents to the winning of the war.

Eight general themes developed from President Roosevelt's war message to Congress on January 6, 1942, were taken as the basis for subject matter. The competition was made possible by collaboration between artists and business concerns with R. Hoe & Co., Inc., underwriting the expenses of the project. Among the prizes donated were four by R. Hoe & Co., Inc., four by the Council of Democracy and one by the International Business Machine Corp.

—Courtesy Artists for Victory, Inc.

The theme of the above poster is "Production," painted by Dick Bates of Chicago, Ill., who won a $300 War Bond, sponsored by Artists for Victory, Inc.

The subject matter of these four posters is especially timely. In the mines, mills and industrial plants, getting to the job on time helps maximum production of war materials, whereas voluntary absenteeism deserves a pay-check from Hitler.

The losses in shipping by the United Nations has reached a very high figure and the importance of "zipping your lip" cannot be over-emphasized, no matter where one is employed. This theme is portrayed by the second poster.

The third one shown on page 51 emphasizes the importance of buying bonds to smash the Axis. Our new food rationing system is now a reality, and it reaches into the home of every American, therefore the theme of the last poster portrays an experience the like of which everybody is more than willing to undergo.

Reproduced posters can be had for 25 cents each, from Artists for Victory, Inc., 101 Park Avenue, New York, N. Y. Large quantities may also be obtained by companies with their name or credit line printed at the bottom.

"Loose Talk," sponsored by Artists for Victory, Inc., was painted by Henry Koerner, Brooklyn, N. Y., winner of a $300 War Bond

Western States

The shortage of gasoline is putting "Rocky Mountain canary birds" back into circulation in many western mining districts

ARIZONA

»»» Enactment of legislation covering occupational diseases arising from dust, compensable under the Workmen's Compensation Law may be asked of the Arizona legislature that convenes in January. The Arizona State Medical Association's committee on industrial health and a subcommittee on silicosis has recommended that such a measure be passed. The last state legislature requested that the medical association study the state's silicosis situation and report on findings. A report was made in a conference of mining, labor, and medical association representatives.

Gov. Sidney P. Osborn of Arizona was reported as asking for a just and fair measure for submission to the legislature. "I am sure the legislature will at least enact a silicosis law," Governor Osborn said. "If a proper bill is not worked out, it is possible the legislature might pass one that is not so good."

»»» A small-lot manganese and chrome stockpile has been established at Parker, Ariz., by the Metals Reserve Company to serve Arizona and southern California producers, it is announced by Charles F. Willis, Phoenix, consultant for the company. The arrangement for Arizona will serve producers who operate in the area lying between Wickenburg and the California state line to the west, including the localities of Alamo, Aguila, Artillery Peak, Wenden, Salome, Bouse, and Quartzsite. The project has been placed in charge of Harold P. Newman, transferred from Elizabethton, Tenn.

Manganese ores of 35 percent or better will be taken in lots as small as 10 tons at the same prices that prevail at the large stockpiles in Phoenix, Ariz., and Deming, N. Mex., it is said.

»»» Lead and zinc property formerly operated by W. I. Johnson, located below Supai in Coconino County, has been taken over by San Francisco mining interests represented by E. B. Stephens and James D. Culbertson. Until recently they have operated gold properties in Nevada, California and Arizona.

In the new operations, an Arizona corporation, the Havasu Lead and Zinc Mining Company of 1,000 shares has been formed. The company's headquarters have been established at Goodwin, in Yavapai County.

»»» Abandoned since 1922, and isolated by removal of its railway lifeline 10 years later, the old Silver Bell mining district of southern Arizona may be reopened as an open pit property. At its peak, Silver Bell was a thriving mines community of 3,000, located 30 miles northwest of Tucson. Its new development program has been submitted to the War Production Board in Washington for approval. Planned is an extensive stripping operation to remove waste rock to convert the property to the open pit method of mining; and a mill to treat the copper ore.

The property was mined steadily from 1915 to 1922 by the American Smelting and Refining company, and it is reported that nearly six million tons of copper ore was produced in those years, the peak year being in

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MONARCH WHYTE STRAND
PRE formed INTERNALLY LUBRICATED
MACWHYTE'S PREMIER WIRE ROPE

—*Courtesy Artists for Victory, Inc.*

"Buy More Bonds and Stamps," painted by E. B. Greenhaw, Memphis, Tenn., the winner of a $300 War Bond, sponsored by Artists for Victory, Inc.

—*Courtesy Artists for*

"Go Without, So They Won't Have To," sponsored by the C for Democracy was painted by Henry Koerner, Brooklyn, making him the winner of two $300 War Bonds

1917 when the copper value reached $2,124,000. Output during the war years 1917-1918 reached above 15,000,000 lb. of copper. Large scale operations were suspended after 1922.

NEW MEXICO

»»» Mines of the Carlisle district of western New Mexico, said to be the oldest in the southwest operating since 1860, have their sole outlet at Duncan, Ariz., where trading for both stores and employes has been carried on in the past.

The property is now being operated by the East Camp Exploration Syndicate, and the outlook for the production of zinc and lead is said to be promising. A 14-ft. highway to the camp is being constructed by the Bureau of Roads, and will serve the Alabam, Laura, Carlisle, and Billingsley Brothers mines, all in New Mexico, producers of lead and zinc.

UTAH

»»» Controversy over hours to be worked in Utah coal mines with the view of relieving the shortage of fuel in western states reached a climax last month when the Army ordered 15,000 tons shipped from eastern fields to supply military bases in Salt Lake valley.

The coal mines of Utah, which supply much of the fuel for Intermountain and some Pacific Coast states, are now operating on a six-day week, seven-hour day basis. Operators contend that by operating six days per week and eight hours per day, sufficient coal would be produced to supply the needs of this area, including military requirements. Governor Herbert B. Maw, of Utah, investigated the situation and recommended that the mines work seven days per week and seven hours per day. Operators contend that this is not practical and insist that better results can be obtained with one day of rest for the men and a day in which to service and repair the equipment.

Representatives of the coal operators declare that solution to the problem is in the hands of one man—John L. Lewis. They claim they have implored Mr. Lewis, president, United Mine Workers, to order the Utah mines to go on an eight-hour day. But, there is no favorable response from Mr. Lewis, they say. Meanwhile, the coal shortage continues and the army is forced to burden the already harassed railroads with another load in order to ship coal from West Virginia to Utah, the latter of which is known to contain the world's largest deposits of bituminous coal.

»»» Development of coal deposits in Carbon County, Utah, to supply the new $150,000,000 steel plant of the Columbia Steel Corporation at Geneva, Utah, is proceeding according to schedule, it is announced. The Columbia company, a subsidiary of United States Steel, is opening up a deposit in Horse Canyon, contiguous to the original Columbia mine. Development and installations are progressing with the view of developing a capacity of 8,500 tons of bituminous coal per day, which will be used at the Geneva plant. Capacity of the original mine is also being increased to help meet the requirements of the expansion of the steel industry in Utah, which also includes enlargement of the Ironton plant of the Columbia company, near Provo.

Work at the Geneva plant is proceeding satisfactorily and by midyear, 1943, it should be adding its valuable flow of iron to the war effort.

»»» Production of coal in Utah is running 49 per cent ahead of 1941, according to B. P. Manley, secretary of the Utah Coal Operators' Association. There is no serious shortage of laborers, he said, but added that a large number of key men could be used in various mines throughout the district.

»»» Furloughing of 2,500 miners from the armed forces to return to western mines, has greatly relieved a critical situation in the copper, lead and zinc mining districts, but still more could be used, according to a survey of the situation in Utah.

»»» The new $500,000 tungsten plant of the United States Vanadium Company, which is now under construction in Salt Lake valley, should be ready for operation by March, 1943, according to D. D. Baker, superintendent.

»»» Diamond drilling operations, designed to determine the feasibility of reopening the Big Indian property near La Sal, Utah, have been undertaken by the Ohio Copper Company of Utah. The Big Indian property produced some copper ore during the last war, but has been inactive since the early twenties.

»»» Under the direction of the Bureau of Mines, the old Tasso shaft of the Wah Wah Mining Company, located about 20 miles westerly from Milford, Utah, is being reclaimed. The shaft is being pumped out to the 200-ft. level, where, after rehabilitation, exploration work will be conducted in an effort to find the downward extension of lead-zinc ore.

IDAHO

»»» The Lexington Mining Company, of Neihart, Mont., announces through its secretary, C. J. Batter, of Washington, D. C., the purchase of 850,000 shares of the capital stock of the Callahan Consolidated Mining Company, which is reopening the Rex and Patuxent mines near Wallace, Idaho. The Callahan Consolidated has just completed construction of a 300-ton milling plant which is expected to be in operation early in 1943. Donald A. Callahan, of Wallace, is president of both companies.

»»» Federal Mining & Smelting Company has unwatered more than 400 ft. of the old 'Frisco mine at Gem and has recently started development of an ore body 13 ft. wide in a new crosscut from the 400 level. Stoping operations are now in progress on both the 200 and 400 levels. The mine was formerly operated to a depth of 3,200 ft. on a body of zinc-lead ore which parallels the present development.

»»» Clayton Silver Mines Company, headquarters in Wallace and mine operations at Clayton in Custer County, has declared a Christmas dividend of 1½ cents a share on a capital issue of 3,000,000 shares, totaling $45,000. The company paid its first dividend last April and the present disbursement brings the total paid to date to $105,000. Metals recovered from the ore mined are lead, zinc and silver.

»»» Mining companies of the Coeur d'Alene district declared dividends in 1942 totaling $5,147,480, as compared with $6,085,129 for the year 1941 and $4,880,614 in 1940. The shortage of nearly one million dollars in dividends between this year and

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last is due to a number of causes, principal among which is increased taxation and an acute labor shortage during the last quarter.

»»» Coeur d'Alene district mining companies have received notice from Landon F. Strobel, executive secretary of the quota committee handling premium prices for copper, lead and zinc, that the committee has worked out a premium payment plan to be applied in connection with the "quota" plan adopted a year ago. The new plan is based on metal content allowed in smelter settlements, whereby the Government premium price will be allowed on a higher percentage metal content than that allowed in the smelter settlement price. The new ruling is designated as "Rule 13" and supersedes all other rules on the subject.

Monthly production quotas and monthly production for determining the amount of over-quota production on which premium payments are made, according to the ruling, will be based on the following percentages for the respective metals regardless of the percentages of the metals actually recovered. For ores milled at custom plants payment will be based on 87 per cent of the copper, 86 per cent of the lead and 77 per cent of the zinc content of the ore. For ores or concentrates shipped direct to smelter or electrolytic reduction plant payment will be based on 97 per cent of the copper, 95 per cent of the lead and 90 per cent of the zinc. As the ruling affects the coeur d'Alene district the difference in price from present settlement contracts amounts to an increase of 5 per cent on lead and 10 per cent on zinc.

Mines with zero ratings will receive the most benefit, amounting to about $385 on every 200 tons of 70 per cent grade lead ore treated by the smelter.

»»» Lucky Friday Mining Company shipped 57 tons of lead and zinc concentrates to the Bunker Hill smelter late last month and received net smelter returns of $9,418.94. The lead ore shipment contained 39.3 per cent lead, 334.80 oz. of silver and 7.66 per cent copper. Total ore shipments from Lucky Friday prospecting operations up to the present time have been 311 tons of concentrates for which the company has received $57,337.62, including $6,551.48 in premium payments over the ceiling price. All production has been from a prospect shaft 500 feet deep. The company recently completed final payment on its option price for the property, which totaled $15,000.

COLORADO

»»» The Colorado Mining Association will hold its annual meeting and well known sowbelly dinner at the Shirley Savoy Hotel, Denver, January 28-30. This year's theme "Western Mining War Congress" strikes the keynote of discussion directed to produce more of the raw materials needed for war purposes. Western United States Senators are scheduled on the program.

»»» The Hawkeye lead-zinc mine at Monarch, closed for several years, is being prepared for production by a small crew of men.

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Manufacturers Forum

Bulletin Display Cabinet

A new, modern bulletin display cabinet, known as the M. S. A. Tell-Board, has been announced by Mine Safety Appliances Company. The unit is designed for better display of wartime safety and morale posters, instructions and special messages. Sturdily constructed of non-critical materials, the tell-board's glass front cabinet permits quick change of bulletin material through a novel but thoroughly practical design.

The M. S. A. Tell-Board is illuminated, and equipped with simple,

trouble-proof hardware designed to give years of efficient service. Change of bulletin material is easy with the tell-board, the manufacturer points out. A pivot joint at the top permits the cover to swing up and away from the back where it is retained in an open position by a hold-out latch so that the fibre posting board can be easily removed or replaced.

Tightly fitting seams make the tell-board's use in exposed locations practical. Attractively finished in two-tone green enamel, the unit measures 32 in. by 25 in. by 3½ in., and is equipped with a glass sign with sanblasted letters reading "Safety Bulletins" or "General Bulletins."

More Production From Motors

In a drive to get more war production out of electric motors and at the same time save up to 40 percent of the copper, steel, and aluminum used in their manufacture, Westinghouse Electric & Manufacturing Co. recently began a calling-all-horsepower campaign. This is being done in cooperation with the War Production Board, which has asked motor users to load each unit to the limit.

In a letter to Westinghouse engineers, salesmen, jobbers, and industrial agents Mr. A. C. Streamer, Westinghouse vice president, wrote: "It may seem strange to you that we, who have always been advocates of conservatism in the application of motors and control, should now promote an upward rating, but the shortage of critical materials is daily becoming more acute, and it is, therefore, definitely up to each one of us to do our part in conservation."

To make full use of all motor horsepower, six recommendations were made:

1. Motors open to the air should be overloaded 25 percent above their nameplate rating unless the surrounding temperature is exceptionally high. Enclosed motors can be overloaded 10 percent and direct-current open motors 15 percent under the same conditions.

2. Most plants using small motors have 220- or 440-volt power supplies. WPB has asked that 4.0 volts be used because this reduces the amount of copper required in leads and control apparatus.

3. Use of standard sealed sleeve bearing motors unless ball-bearing motors are absolutely essential. Ball bearings are urgently needed in other war machinery.

4. Use motors of highest practical standard speed and void use of multi-speed motors. Faster motors are smaller and require less critical materials to build.

5. Use alternating-current motors in preference to direct-current types wherever possible. This saves substantial amounts of copper and helps alleviate a shortage of direct-current motor manufacturing capacity.

6. Match control and circuit protective equipment to the motor on the basis of nameplate horsepower rating, thus getting the maximum use from control equipment.

These examples of saving were cited:

Thirty-six pounds of vital materials are conserved by using a motor rated at 1 hp., instead of 1½ hp., for a 1¼-hp. load.

Sixty-three pounds of materials are saved by using a motor rated at 5 hp. for a 6¼-hp. load. Ordinarily a motor rated at 7½ hp. would be applied to such a job.

Five hundred and fifty pounds of material are saved when a motor rated at 100 hp. is used for a 125-hp. maximum load. Usually a 125-hp. motor would be ordered.

The program calls for close teamwork between industry and Westinghouse engineers to determine the exact horsepower needed by each machine that is to be driven. With these findings, motor users can take advantage of favorable operating conditions and extra service factors built into the motors.

Checking Industrial Dermatitis

Announcement of M. S. A. Fend, industrial skin creams and lotions for barrier protection of the worker's skin against industrial dermatitis, of interest to industrial medical directors, safety engineers, and plant executives concerned with checking the urgent problem of industrial dermatitis and keeping men and women on the job without loss of time and production, is made by Mine Safety Appliances Company, Pittsburgh, Pa., exclusive Fend distributor.

Fend creams and lotions are stated to provide a protective barrier on the skin against many specific hazards in industry. Consisting of cosmetically-safe materials, Fend creams are medically correct, easy to apply, and are bland and neutral. Offering no interference with the normal action of the skin glands, the creams protect and are emollient to the skin; are readily removed with mild soap and warm water.

Six different types of this product is said to provide protection against a number of specific skin hazards.

Clothing For Women Welders

To meet the needs of the many women welders now employed and being trained, General Electric Company, Schenectady, N. Y., has announced a complete line of safety clothing designed especially for women welding operators. Safety, durability, and smart styling are combined in the new line which is based on the

results of an extensive industrial survey of safety requirements for women welders.

Featured in the line are leather sleeves, aprons, jackets, leather gloves, and a special women's head and hair covering which protects the hair from sparks and slag and can be used with any of the modern welding helmets.

All items in the line are of high-

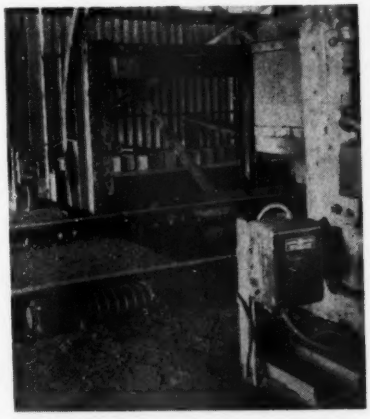
quality material, comfortable, and light in weight—yet they provide full protection for all parts of the body. The new line supplements G. E.'s complete line of apparel for men welders.

A new bulletin, GEA-3295, gives complete details and specifications on G. E.'s new line of safety clothing for women.

Phototube Guards Against Accidents

Loaded coal cars are emptied at the New Piney Fork preparation plant of the Hanna Coal Company, Ohio, by being rolled onto a rotary dump, fastened to the rails by a mechanical device, and then rolled upside down over a chute. After the car has been righted again, it moves off the dump by gravity.

It is essential that the dump does not revolve the next full car until the preceding empty one has moved off.



Otherwise, the empty car will be turned over onto the floor.

At intervals, however, the plant experienced difficulty with this arrangement. The dump would revolve before the empty car had cleared. This usually happened because a particular car took too long to move off.

This difficulty was remedied when a General Electric photo-electric relay and light source were installed on opposite sides of the track at the "empty" end of the dump. Now the dump cannot revolve as long as the light beam between the light source and the phototube in the photoelectric relay is blacked out by the body of the empty car.

Award Program For Engineering Students

The James F. Lincoln Arc Welding Foundation of Cleveland, Ohio, recently announced its first award program in the field of undergraduate engineering study.

The Foundation's new project is the $6,750 Annual Engineering Undergraduate Award and Scholarship Program. Its object, as expressed in rules and conditions governing participation, is "to encourage engineering students to study arc welded construction so that their imagination, ability and vision may be given opportunity to extend knowledge of this method and thus aid the war effort and the economic reconstruction in the peace which is to follow."

The program offers $5,000 in student awards and $1,750 in scholarships for the departments of the institutions in which the award-winning students are registered.

There are 77 student awards—a first award of $1,000, second of $500, third of $250, four awards of $150, eight of $100, twelve of $50 and fifty of $25.

There are seven scholarships of $250 each. The school of the first award winner will receive four scholarshps totalling $1,000; the school of the second winner will receive two scholarships totalling $500, and the school of the third winner will receive one scholarship of $250.

Any resident engineering undergraduate student registered in any school, college or university in the United States, or any cadet registered in the United States Military Academy, United States Naval Academy and Coast Guard Academy is eligible to submit a paper.

The awards will be made for papers describing the conversion from other methods to arc welded construction of parts of machines, complete machines, trusses, girders or structural parts. The subject may be something which the student has observed in school shops, magazines, books, printed matter or elsewhere; or he may conceive of a subject which has never been built but could be built by arc welding. The Foundation encourages the preparation of the type of paper which will not interfere, seriously, with the student's regular college activities.

If the paper covers a project, the project may have been started before December 1, 1942, but it must have been completed within the period December 1, 1942, to April 1, 1943. Rules and other information about the program can be obtained from James F. Lincoln Arc Welding Foundation, Cleveland, Ohio.

Simplified Practice Recommendation For Wire Rope

A proposed Simplified Practice Recommendation for Wire Rope has just been submitted to producers, distributors, users, and others interested for approval or comment, according to an announcement by the Division of Simpilfied Practice, National Bureau of Standards.

This recommendation, which includes sizes, constructions, grades and breaking strengths of the vast majority of tonnage of wire rope, is based on an exhaustive analytical review of existing published standards of the industry. The recommendation is designed to conserve strategic materials and available productive capacity for the war program and at the same time adequately care for important consumer requirements.

General adherence to the 20 tables shown in this recommendation will result in a net reduction in variety, from 973 items to 643, or 33.9 percent. The major production and use of wire rope, and therefore the predominant tonnage, is covered by four different rope constructions, where the reduction in variety is from 352 items to 182, or 48 percent.

The proposed recommendation was developed by the Contact Committee of the Wire Rope and Strand Manufacturers Association and submitted for passage through the regular procedure of the Division of Simplified Practice, National Bureau of Standards, at the request of the Wire and Wire Products Section, Iron and Steel Branch of the War Production Board.

Distributors and users of wire rope that are desirous of aiding the war program by conforming with this important conservation measure are invited to write to the Division of Simplified Practice, National Bureau of Standards, Washington, D. C., for mimeographed copies of the proposed Simplified Practice Recommendation.

CATALOGS AND BULLETINS

GOVERNORS. *Hoof Products Co.*, 6543 S. Laramie Avenue, Chicago, Ill. The company offers an illustrated bulletin describing features of its governors, controlling the speed of trucks and automobiles. 24 pp.

IGNITRON RECTIFIERS FOR MINING SERVICE. *Westinghouse Elec. & Mfg. Co.*, East Pittsburgh, Pa. A new 4-page booklet on the application of ignitron rectifiers for mining service is offered by the manufacturer. It briefly describes the ignitron rectifier and outlines its particular application to the mining industry.

LARRY CARS. *Differential Steel Car Co.*, Findlay, Ohio. Bulletin D-50 describes and illustrates features of the manufacturers complete line of Larry cars for stockpiling and waste disposal. 4 pp.

MACHINE TOOL ACCESSORIES. *Ideal Commutator Dresser Co.*, Sycamore, Ill. The Machinery Products Division of the company offers a booklet describing metal etchers, demagnetizers, variable speed pulleys, and electric markers. 8 pp.

MACHINING ALUMINUM. *Aluminum Co. of America*, Pittsburgh Pa., offers a booklet setting forth the general principles of machining aluminum and its alloys. Suggests speeds, feeds, and depths of cut which will produce satisfactory results. The booklet is divided into two parts, the first dealing with general machine shop practice and the second describing the practices employed in automatic screw machine operations. 44 pp.

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INDEX TO ADVERTISERS

	Page
American Chain & Cable Co., Inc. American Cable Division	Third Cover
Bethlehem Steel Co.	10
Cleveland Rock Drill Co., The	2
Deister Concentrator Co., The	53
Edison, Inc., Thomas. A. Storage Battery Division	9
Electric Storage Battery Co., The	Second Cover
General Electric	7
Hoffman Bros. Drilling Co.	56
I-T-E Circuit Breaker Co.	56
Johnson-March Corp., The	46
Joy Mfg. Co.	4-5
Loftus, Peter F.	53
Macwhyte Co.	50
Marion Steam Shovel Co.	8
Mine Safety Appliances Co.	Back Cover
Mott Core Drilling Co.	56
Ohio Brass Co.	3
Pennsylvania Drilling Co.	56
Roberts & Schaefer Co.	52
Robinson Ventilating Co.	56
Simplicity Engineering Co.	52
Timken Roller Bearing Co., The	6
Universal Vibrating Screen Co.	56
Young, L. E.	53

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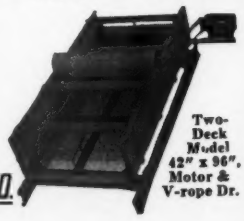

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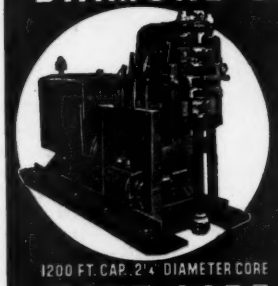

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